Volume

2006

BUILDING CODE COMPENDIUM

Ontario

Ministry of Municipal Affairs and Housing
Building and Development Branch

Ontario

2006
Building Code Compendium

Volume 2

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COMMENCEMENT

Supplementary Standards SA-1, SB-1 to SB-11 and SC-1 come into force on the 31st day of December, 2006.

See "Code Amendment History" page in the Preface of Volume 1 for information concerning amendments to Supplementary Standards issued through Minister's Rulings.

$\mathbf{a}_1$ Amendment made to Appendix A or B issued April 2nd, 2007.

ERRATA

$\mathbf{e}_1$ Issued April 2nd, 2007.

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Appendix A

Appendix A to this document is included for explanatory purposes only and does not form part of the requirements. The bold-face reference numbers that introduce each item apply to the requirements in the Code.

Explanatory Material for Division A

A-1.1.2. Limit of Application.

The provisions in this Code are intended to establish minimum acceptable standards for public health and public safety, fire protection, structural sufficiency, conservation, environmental integrity, barrier-free use and access. They are not intended to be applied to voluntary installations unless specified in the Code.

For example, a firewall installed for insurance purposes need not comply with the requirements in Subsection 3.1.8. of Division B unless it is used as a means to create 2 buildings for the purposes of other Code requirements. Similarly, it is not intended that voluntary standpipe installations comply with the relevant requirements in Subsection 3.2.9. of Division B. Voluntary installations should not detrimentally affect features required by the Code.

A-1.1.2.7. Existing Buildings.

This Article describes the extent of renovation subject to the Building Code: only the areas or portions of a building being renovated, or other parts of a building adversely affected by that renovation need comply with the requirements of the Code; all other areas or portions need not comply with the Code and may remain unchanged.

A-1.1.3.1. Buildings Divided by Firewalls.

This concept relates to the provisions directly regulated by this Code and does not apply to electrical service entrance and natural gas service requirements which are regulated by other documents.

A-1.2.1.1.(1)(a) Compliance via Acceptable Solutions.

If a building design (e.g. material, component, assembly or system) can be shown to meet all provisions of the applicable acceptable solutions in Division B (e.g. it complies with the applicable provisions of a referenced standard), it is deemed to have satisfied the objectives and functional statements linked to those provisions and thus to have complied with that part of the Code. In fact, if it can be determined that a design meets all the applicable acceptable solutions in Division B, there is no need to consult the objectives and functional statements in Division A to determine its compliance.

A-1.2.1.1.(1)(b) Compliance via Alternative Solutions.

Where a design differs from the acceptable solutions in Division B, then it should be treated as an "alternative solution". A proponent of an alternative solution must demonstrate that the alternative solution addresses the same issues as the applicable acceptable solutions in Division B and their attributed objectives and functional statements. However, because the objectives and functional statements are entirely qualitative, demonstrating compliance with them in isolation is not possible. Therefore, Clause 1.2.1.1.(1)(b) identifies the principle that Division B establishes the quantitative performance targets that alternative solutions must meet. In many cases, these targets are not defined very precisely by the acceptable solutions - certainly far less precisely than would be the case with a true performance code, which would have quantitative performance targets and prescribed methods of performance measurement for all aspects of building performance. Nevertheless, Clause 1.2.1.1.(1)(b) makes it clear that an effort must be made to demonstrate that an alternative solution will perform as well as a design that would satisfy the applicable acceptable solutions in Division B - not "well enough" but "as well as".

In this sense, it is Division B that defines the boundaries between acceptable risks and the "unacceptable" risks referred to in the statements of the Code's objectives, i.e. the risk remaining once the applicable acceptable solutions in Division B have been implemented represents the residual level of risk deemed to be acceptable by the broad base of Canadians who have taken part in the consensus process used to develop the Code.

Level of Performance

Where Division B offers a choice between several possible designs, it is likely that these designs may not all provide exactly the same level of performance. Among a number of possible designs satisfying acceptable solutions in Division B, the design providing the lowest level of performance should generally be considered to establish the minimum acceptable level of performance to be used in evaluating alternative solutions for compliance with the Code.

Sometimes a single design will be used as an alternative solution to several sets of acceptable solutions in Division B. In this case, the level of performance required of the alternative solution should be at least equivalent to the overall level of performance established by all the applicable sets of acceptable solutions taken as a whole.

Each provision in Division B has been analyzed to determine to what it applies and what it is intended to achieve. The resultant application and intent statements clarify what undesirable results each provision seeks to preclude. These statements are not a legal component of the Code, but are advisory in nature, and can help Code users establish performance targets for alternative solutions. They will be published in an electronic version on CD-ROM.

Areas of Performance

A subset of the acceptable solutions in Division B may establish criteria for particular types of designs (e.g. certain types of materials, components, assemblies, or systems). Often such subsets of acceptable solutions are all attributed to the same objective: Fire Safety, for example. In some cases, the designs that are normally used to satisfy this subset of acceptable solutions might also provide some benefits that could be related to some other objective: Fire Protection of the Building, for example. However, if none of the applicable acceptable solutions are linked to Objective OP1, Fire Protection of the Building, then alternative solutions proposed to replace these acceptable solutions are not required to provide a similar benefit related to Fire Protection of the Building. In other words, the acceptable solutions in Division B establish acceptable levels of performance for compliance with Division B only in those areas defined by the objectives and functional statements attributed to the acceptable solutions.

Applicable Acceptable Solutions

In demonstrating that an alternative solution will perform as well as a design that would satisfy the applicable acceptable solutions in Division B, its evaluation should not be limited to comparison with the acceptable solutions to which an alternative is proposed. It is possible that acceptable solutions elsewhere in the Code also apply. The proposed alternative solution may be shown to perform as well as the most apparent acceptable solution which it is replacing but may not perform as well as other relevant acceptable solutions. For example, an innovative sheathing material may perform adequately as sheathing in a wall system that is braced by other means but may not perform adequately as sheathing in a wall system where the sheathing must provide the structural bracing. All applicable acceptable solutions should be taken into consideration in demonstrating the compliance of an alternative solution.

a_1 Relationship between Division A and Division B

Supplementary Standard SA-1 sets out the objectives and functional statements which have been attributed to the acceptable solutions provided in Division B of the Building Code.

"Acceptable solution" is defined in Article 1.4.1.2. of Division A. Objectives and functional statements have accordingly been attributed to each provision of Parts 3 to 12 of Division B that is considered to be a "requirement", that is, a provision that provides criteria necessary to determine compliance with Division B. Requirements may specify performance values, qualities, quantities, design methods and test methods that are required in order to comply with Division B.

Objectives and functional statements have not been attributed to provisions of Division B which are not considered to be "requirements", but rather assist in the interpretation of requirements by fulfilling the following functions:

- Introductions: specifies the scope and/or application of requirements (for example, Sentence 5.1.2.1.(1) of Division B, which specifies that application of Part 5);

- Application modifiers: expand or limit the application of a requirement without changing its intent (for example, Sentence 9.35.2.1.(1) of Division B, which expands the application of the requirements for garages to a carport with more than 60% of its perimeter enclosed);

- Exemptions: waive the application of a requirement (for example, Sentence 6.2.2.3.(6) of Division B, which exempts open-air storeys in a storage garage from the mechanical exhaust requirements of the remainder of Article 6.2.2.3.);

- Signpost: provides direction to another requirement which would in any event be applicable (for example, Sentence 3.13.5.1. of Division B, which directs the Code user to the requirements of Subsection 3.2.4. for fire alarm and detection systems in rapid transit stations);

- Classifications: categorize and sort requirements or aspects of requirements (for example, Sentence 8.1.2.1.(1) of Division B, which classifies the types of sewage systems)

- Clarifications: explain the intent of a requirement (for example, Sentence 5.2.2.1.(2) of Division B, which identifies the structural loads referenced in the remainder of Article 5.2.2.1.);

- Definitions: defining terms used in a requirement (for example, Sentence 7.1.3.1.(1) of Division B, which defines "storey" for the purpose of Part 7);

- Administrative provisions: specifies the use of, and determination of compliance with, requirements (for example, Sentence 9.6.5.1.(1) of Division B, which requires labelling of exterior wood doors to facilitate enforcement of the requirements of the remainder of Article 9.6.5.1.);

Requirements of Division B will often be dependent on other provisions of Division B to which objectives and functional statements have not been attributed.

For example, Sentence 3.2.4.1.(2) of Division B lists the conditions when a fire alarm system is required. Objective OS1.5 and functional statement F11 are attributed to this requirement. However, this sentence must also be examined in the context of Sentences 3.2.4.1.(3), (4) and (5), which are not characterized as requirements (and therefore have not been attributed objectives or functional statements) but are necessary to explain the context of that Sentence. In this instance, Sentences (3), (4) and (5) list exceptions and modifications to Sentence (2).

As a result, in evaluating the level of performance of an acceptable solution for the purposes of assessing an alternative solution, regard must be had both to requirements (to which objectives and functional statements have been attributed in this Standard) and to other provisions (to which objectives and functional statements have not been attributed in this Standard) related to the requirement.

A-1.4.1.2. Defined Terms.

Exit

Exits include doors or doorways leading directly into an exit stair or directly to the outside. In the case of an exit leading to a separate building, exits also include vestibules, walkways, bridges and balconies.

Farm Building

Farm buildings as defined in Article 1.4.1.2. include but are not limited to produce storage and packing facilities, livestock and poultry housing, milking centres, manure storage facilities, grain bins, silos, feed preparation centres, farm workshops, greenhouses, farm retail centres, and horse riding, exercise and training facilities. Farm buildings may be classed as low or high human occupancy depending on the occupant load.

Examples of farm buildings likely to be classed as low human occupancy as defined in Article 1.2.1.2. of the National Farm Building Code of Canada are livestock and poultry housing, manure and machinery storage facilities and horse exercise and training facilities where no bleachers or viewing area are provided.

Examples of other buildings that would be classed as other than low human occupancy include farm retail centres for feeds, horticultural and livestock produce, auction barns and show areas where bleachers or other public facilities are provided. Farm work centres where the numbers of workers frequently exceeds the limit for low human occupancy will also be in this category.

It is possible to have areas of both high and low human occupancy in the same building provided that the structural safety and fire separation requirements for high human occupancy are met in the part thus designated.

Fire Separation

A fire separation may or may not have a fire-resistance rating.

Heritage Building

This definition facilitates acknowledgement and acceptance of the significance of such a building through creditable means.

a_1 Plumbing System

"Plumbing" is defined in the *Building Code Act, 1992*. Each of the three systems (drainage, venting, water) appearing in the definition are further defined in Article 1.4.1.2., with the end result that a plumbing system encompasses all three elements.

Other piping systems as listed below are excluded from plumbing system since the definition of water system limits the system to the point of juncture with outlets, fixtures, etc. Similarly, a drainage system starts at the fixture or plumbing appliance it drains.

A plumbing system does not include,

(a) a system of piping,
  (i) for space heating in which water is used as a medium to transfer heat,
  (ii) in which liquids or vapours are circulated for the purpose of cooling or refrigeration,
  (iii) through which air is passed for the purpose of controlling the temperature, humidity or motion of air passing through the system,
  (iv) that conveys water for the purpose of providing water or nutrients to the soil,
  (v) that conveys water for the purpose of landscaping or for the care of animals, birds or fish,
  (vi) that transmits force by means of water or by means of a liquid other than water in which water is used for cooling,
  (vii) that conveys liquids for the purpose of melting ice or snow, or
  (viii) that uses water in the conveyance of flammable gas or fuel; or

(b) a well, a well pump installed for the purpose of conveying water from a well, a pressure tank and pump if the tank and pump are combined as a unit, the piping between any well pump and the well, the piping between a well pump and a pressure tank that is installed separate from the pump and the connection of the piping to such pressure tank, and when there is no well pump, any piping connected to the well for a distance of three feet from the outside of the well.

Public Heritage Building

This definition addresses smaller heritage buildings that are to be made available to the public for viewing as examples of an architectural period or periods in the past, depicting how our forebears lived, worked or played, and what artifacts, objects or clothing were in use at that time. These buildings are not considered museums as such, and therefore would not be subject to the more stringent requirements of assembly occupancies for that use.

Public Corridor

A covered mall is considered to be a public corridor and, as such, is subject to the same requirements as a public corridor.

Service Room

Typical examples of service rooms include boiler rooms, furnace rooms, incinerator rooms, garbage handling rooms, and rooms to accommodate air-conditioning or heating appliances, pumps, compressors and electrical equipment. Rooms such as elevator machine rooms and common laundry rooms are not considered as service rooms.

Suite

Tenancy in the context of the term "suite" applies to both rental and ownership tenure. In a condominium arrangement, for example, dwelling units are considered separate suites even though they are individually owned. In order to be of complementary use, a series of rooms that constitute a suite are in reasonably close proximity to each other and have access to each other either directly by means of a common doorway or indirectly by a corridor, vestibule or other similar arrangement.

The term "suite" does not apply to rooms such as service rooms, common laundry rooms and common recreational rooms that are not leased or under a separate tenure in the context of the Code. Similarly, the term suite is not normally applied in the context of buildings such as schools and hospitals, since the entire building is under a single tenure. A rented room in a nursing home could be considered as a suite if the room was under a separate tenure. A hospital bedroom on the other hand is not considered to be under a separate tenure, since the patient has little control of that space, even though he pays the hospital a per diem rate for the privilege of using the hospital facilities, which include the sleeping areas.

For certain requirements in the Code, the expression "room or suite" is used (e.g. travel distance). This means that the requirement applies within the rooms of suites as well as to the suite itself and to rooms that may be located outside the suite. In other places the expression "suite, and rooms not located within a suite" is used (e.g. for the installation of smoke and heat detectors). This means that the requirement applies to individual suites as defined, but not to each room within the suite. The rooms "not within a suite" would include common laundry rooms, common recreational rooms and service rooms, that are not considered as tenant occupied space.

A-1.4.1.3. Applicable Law.

a_1 Applicants for building permits are required to establish compliance with applicable law. The following table lists contact information for those agencies responsible for the statutory provisions defined in Sentence 1.4.1.3.(1).

Applicable Law Provision	Responsible Agency	Contact
Charitable Institutions Act, Section 5, with respect to the approval by the Minister of the site and plans for a new building or an addition to an existing building used or to be used as a charitable institution.	Ministry of Health and Long Term Care	Long-Term Care Planning and Renewal Branch ph: 416-326-6882 or 877-767-8889
Conservation Authorities Act, Clause 28(1)(c)	Local Conservation Authority	
Section 5 of Regulation 262, under the *Day Nurseries Act*, with respect to the approval of plans for a new building to be erected or an existing building to be used, altered or renovated for use as a day nursery or for alterations or renovations to be made to premises used by a day nursery.	Ministry of Children and Youth Services	Central East Regional Office ph: 905-868-8900 Central West Regional Office ph: 905-567-7177 Eastern Regional Office ph: 613-234-1188 Hamilton/Niagara Regional Office ph: 905-521-7280 North East Regional Office ph: 705-474-3540 Northern Regional Office ph: 705-564-6699 South East Regional Office ph: 613-545-0539 South West Regional Office ph: 519-438-5111 Toronto Regional Office ph: 416-325-0500
Development Charges Act, 1997, Sections 28 and 53	Local Municipality	
Education Act, Section 194, with respect to the approval of the Minister for the demolition of a building.	Ministry of Education	Steven Mitchell, Architect ph: 416-325-2015
Education Act, Sections 257.83 and 257.93	Local Municipality	
Section 6 of Regulation 314, of the *Elderly Persons Centres Act*, with respect to the approval of the Minister for the construction of a building project.	Ministry of Health and Long Term Care	Central East (Newmarket) Region ph: 605-954-4700 Central South (Hamilton) Region ph: 905-546-8294 Central West (Mississauga) Region ph: 905-897-4610 East (Ottawa) Region ph: 613.569.5602 North (Sudbury)Region ph: 705-564-3130 Southwest (London) Region ph: 519-675-7680 Toronto Region ph: 416-327-8952

Applicable Law Provision	Responsible Agency	Contact
Environmental Assessment Act: Subsection 5(4) Section 5, with respect to the approval of the Ministry or the Environmental Review Tribunal to proceed with an undertaking. Section 46, with respect to the approval of the Minister to use land or land covered by water that has been used for the disposal of waste.	Ministry of the Environment	Environmental Assessment and Approvals Branch ph: 1-800-461-6290 or 416-314-8001
Environmental Protection Act: Section 168.3.1, with respect to the construction of a building to be used in connection with a change of use of a property. Paragraph 2 of Subsection 168.6(1), if a certificate of property use has been issued in respect of the property under subsection 168.6(1) of the Act.	Ministry of the Environment	Central Region ph: 416-326-6700 or 800-810-8048 Eastern Region ph: 613-549-4000 Northern Region ph: 807-475-1205 or 800-875-7772 Southwestern Region ph: 519-873-5000 or 800-265-7672 West Central Region ph: 905-521-7640 or 800-668-4557
Regulation 469 of the *Funeral Directors and Establishments Act*, with respect to the provision to the Registrar of architectural plans or drawings of the proposed construction or alteration of a funeral establishment.	Ministry of Consumer and Business Services	Board of Funeral Services ph: 416-979-5450 or 1-800-387-4458
Homes for the Aged and Rest Homes Act, Section 14, with respect to the approval of the Minister for the erection or alteration of a building for use as a home or joint home.	Ministry of Health and Long Term Care	Long-Term Care Planning and Renewal Branch ph: 416-326-6882 or 877-767-8889
Milk Act, Section 14, with respect to the permit from the Director for the construction or alteration of any building intended for use as a plant.	Ministry of Agriculture and Food Food Inspection Branch	Dairy Food Safety ph: 519-826-4180 or 1-888-466-2372 ext 6-4180 (Ontario only)
Municipal Act, 2001, Subsection 133(4)	Local Municipality	
Niagara Escarpment Planning and Development Act, Subsection 24(3)	Ministry of Natural Resources	Niagara Escarpment Commission ph: 905-877-5191
Nursing Homes Act: Section 4 of Regulation 832, with respect to the provision to the Director of plans and specifications and such information and other material as may be required by the Director in respect of the construction, alteration, addition to or renovation of a nursing home or conversion of an existing building into a nursing home. Subsections 4(3) and (5) of Regulation 832 of the Revised Regulations of Ontario, 1990	Ministry of Health and Long Term	Care Long-Term Care Planning and Renewal Branch ph: 416-326-6882 or 877-767-8889

Applicable Law Provision	Responsible Agency	Contact
Section 11.1 of O. Reg. 267/03 of the *Nutrient Management Act, 2002*, with respect to a proposed building or structure to house farm animals or store nutrients if that Regulation requires the preparation and approval of a nutrient management strategy before construction of the proposed building or structure.	Ministry of Agriculture and Food	Andrew Jameson ph: 519-826-6366
Ontario Heritage Act: Subsection 30 (2), with respect to a consent of the council of a municipality to the alteration or demolition of a building. Section 33, with respect to the consent of the council of a municipality for the alteration of a property. Section 34, with respect to the consent of the council of a municipality for the demolition of a building. By-laws made under Section 40.1 Section 42, with respect to the permit given by the council of a municipality for the erection, alteration, or demolition of a building.	Local Municipality	
Ontario Heritage Act: Section 34.5, with respect to a consent of the Minister to the alteration or demolition of a designated building Subsection 34.7(2), with respect to a consent of the Minister to the alteration or demolition of a designated building	Ministry of Culture	General Inquiry ph: 416-212-0644 or 1-866-454-0049
Ontario Planning and Development Act, 1994, Section 14, with respect to any conflict between a development plan made under that Act and a zoning by-law that affects the proposed building or structure. Subsection 17(1)	Ministry of Municipal Affairs and Housing	Central Municipal Services Office ph: 1-800-668-0230 Eastern Municipal Services Office ph: 1-800-267-9438 Northeastern Municipal Services Office ph: 1-800-461-1193 Northwestern Municipal Services Office ph: 1-800-465-5027 Southwestern Municipal Services Office ph: 1-800-265-4736

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Applicable Law Provision	Responsible Agency	Contact
Planning Act Section 33, except where in the case of demolition of a residential property, a permit to demolish the property is obtained under that Section Sections 34 or 38 Section 41, with respect to the approval by the council of the municipality of the Municipal Board of plans and drawings. Section 46	Local Municipality	
Planning Act, Section 47	Ministry of Municipal Affairs and Housing	Central Municipal Services Office ph: 1-800-668-0230 Eastern Municipal Services Office ph: 1-800-267-9438 Northeastern Municipal Services Office ph: 1-800-461-1193 Northwestern Municipal Services Office ph: 1-800-465-5027 Southwestern Municipal Services Office ph: 1-800-265-4736
Section 2 of O. Reg. 453/96 of the *Public Lands Act*, with respect to the work permit authorizing the construction or placement of a building on public land.	Ministry of Natural Resources	Main Info Line ph: 1-800-667-1940
Public Transportation and Highway Improvement Act, Section 34 or 38, with respect to the permit from the Minister for the placement, erection or alteration of any building or other structure or the use of land.	Ministry of Transportation	Central Region ph: 416-235-5385 EASTERN REGION: Bancroft Office ph: 613-332-3220 Ottawa Office ph: 613-745-6841 Port Hope Office ph: 905-885-6381 Kingston Office ph: 613-544-2220 NORTHEASTERN REGION: Cochrane Office ph: 705-272-4333 Huntsville Office ph: 705-789-2391 New Liskeard Office ph: 705-647-6761 North Bay Office ph: 705-472-7900 Sault Ste Marie Office ph: 705-945-6611 Sudbury Office ph: 705-564-7722 NORTHWESTERN REGION: Kenora Office ph: 807-468-2740 Thunder Bay Office ph: 807-473-2000 SOUTHWESTERN REGION: Chatham Office ph: 519-354-1400 London Office ph: 519-873-4200 Owen Sound Office ph: 519-376-7350

A-1.5.1.1.(1) Application of Referenced Documents.

Documents referenced in the Building Code may contain provisions covering a wide range of issues, including issues that are unrelated to the objectives and functional statements stated in Parts 2 and 3 of Division A respectively; e.g. aesthetic issues such as colour-fastness or uniformity. Sentence 1.5.1.1.(1) is intended to make it clear that, whereas referencing a document in the Building Code generally has the effect of making the provisions of that document part of the Code, provisions that are unrelated to buildings or to the objectives and functional statements attributed to the provisions in Division B where the document is referenced are excluded.

Furthermore, many documents referenced in the Building Code contain references to other documents, which may also, in turn, refer to other documents. These secondary and tertiary referenced documents may contain provisions that are unrelated to buildings or to the objectives and functional statements of the Building Code; such provisions - no matter how far down the chain of references they occur - are not included in the intent of Sentence 1.5.1.1.(1) of Division A.

A-2.2.1.1.(1) Objectives.

Listing of Objectives

a_1 Any gaps in the numbering sequence of the objectives are due to the fact that there is a master list of objectives covering the Building Code, Fire Code and the three principal model National Code Documents (National Building Code of Canada 2005, National Plumbing Code of Canada 2005 and National Fire Code of Canada 2005) but not all objectives are pertinent to all Codes.

The Building

a_1 Where the term "the building" is used in the wording of the objectives, it refers to the building for which compliance with the Building Code is being assessed.

Emergency

The term "emergency" - in the context of safety in buildings - is often equated to the term "fire emergency"; however, the wording of objectives OS3.7 and OS5.9 makes it clear that the Code addresses any type of emergency that would require the rapid evacuation of the building, such as the release of hazardous substances or the presence of intruders.

A-3.2.1.1.(1) Functional Statements.

Listing of Functional Statements

The numbered functional statements are grouped according to functions that deal with closely related subjects. For example, the first group deals with fire risks, the second group deals with emergency egress and response, etc. There are gaps in the numbering sequence for the following reasons:

- Each group has unused numbers which allows for the possible future creation of additional functional statements within any one group.
- a_1 There is a master list of functional statements covering the Building Code, Fire Code and the three principal model National Code Documents (National Building Code of Canada 2005, National Plumbing Code of Canada 2005 and National Fire Code of Canada 2005) but not all functional statements are pertinent to all Codes.

Explanatory Material for Division B

A-1.1.2.1.(1) Climatic and Seismic Values.

Climatic information for municipalities not listed in Supplementary Standard SB-1 may be obtained by writing to:

Meteorological Service of Canada, Environment Canada
4905 Dufferin Street, Toronto, Ontario M3H 5T4.

Seismic information for municipalities not listed in Supplementary Standard SB-1 may be obtained from:

- the Natural Resources Canada Web site at: www.EarthquakesCanada.ca
- the Geological Survey of Canada at: 7 Observatory Crescent, Ottawa, Ontario KIA OY3, or
  P.O. Box 6000, Sidney, B.C. VSL 4B2.

A-1.1.2.1.(2) Winter Design Temperatures.

The 2½ per cent values referenced in Sentence 1.1.2.1.(2) are the least restrictive temperatures that can be used. If a designer chooses to use the 1 per cent values shown in Supplementary Standard SB-1, they would be in excess of the Code minimums and would be considered acceptable.

A-1.3.2.1. Abbreviations of Proper Names

The following table provides contact information for organizations referenced in this Code:

Name	Address	Contact
ACGIH	American Conference of Governmental Industrial Hygienists 1330 Kemper Meadow Drive Cincinnati, Ohio 45240, USA	ph: 513-742-2020 fax: 513-742-3355 e-mail: mail@acgih.org web site: www.acgih.org
ANSI	American National Standards Institute 25 West 43rd Street, 4th Fl. New York, New York, 10036, USA	ph: 212-642-4900 fax: 212-398-0023 e-mail: info@ansi.org web site: www.ansi.org
APHA	American Public Health Association 800 I Street, NW Washington, DC 20001, USA	ph: 202-777-2742 fax: 202-777-2534 TTY: 202-777-2500 e-mail: apha@pbd.com web site: www.apha.org
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers 1791 Tullie Circle, N.E. Atlanta, GA 30329, USA	ph: 404-636-8400 800-527-4723 fax: 404-321-5478 e-mail: ashrae@ashrae.org web site: www.ashrae.org
ASME	The American Society of Mechanical Engineers P.O. Box 2300 Fairfield, NJ 07007-2300, USA	ph: 800-843-2763 fax: 973-882-1717 e-mail: infocentral@asme.org web site: www.asme.org
ASSE	American Society of Sanitary Engineering 901 Canterbury Suite A Westlake, OH 44145, USA	ph: 440-835-3040 fax: 440-835-3488 e-mail: info@asse-plumbing.org web site: www.asse-plumbing.org

Name	Address	Contact
ASTM	American Society for Testing and Materials 100 Barr Harbor Drive PO Box C700 West Conshohocken, PA, 19428-2959, USA	ph: 610-832-9585 fax: 610-832-9555 e-mail: service@astm.org web site: www.astm.org
AWPA	American Wood-Preservers' Association P.O. Box 361784 Birmingham, AL 35236-1784, USA	ph: 205-733-4077 fax: 205-733-4075 e-mail: email@awpa.com web site: www.awpa.com
AWWA	American Water Works Association 6666 W. Quincy Ave Denver, CO 80235, USA	ph: 303-794-7711 800-926-7337 fax: 303-347-0804 e-mail: custsvc@awwa.org web site: www.awwa.org
BNQ	Bureau de Normalisation du Québec 333, rue Franquet Québec, Québec G1P 4C7	ph: 418-652-2238 800-386-5114 fax: 418-652-2292 e-mail: bnqinfo@bnq.qc.ca web site: www.bnq.qc.ca
CCBFC	Canadian Commission on Building and Fire Codes National Research Council Canada Building M-23A 1200 Montreal Road Ottawa, Ontario K1A 0R6	ph: 613-993-9960 fax: 613-952-4040 e-mail: codes@nrc-cnrc.gc.ca web site: www.nationalcodes.ca
CGSB	Canadian General Standards Board 11 Laurier Street Gatineau, Quebec K1A 1G6	ph: 819-956-0425 800-665-2472 fax: 819-956-5740 e-mail: ncr.cgsb-ongc@pwgsc.gc.ca web site: www.pwgsc.gc.ca/cgsb
CSA	Canadian Standards Association 5060 Spectrum Way, Suite 100 Mississauga, Ontario L4W 5N6	ph: 416-747-4044 800-463-6727 fax: 416-747-2510 e-mail: sales@csa.ca web site: www.csa.ca
CWC	Canadian Wood Council 99 Bank Street, Suite 400 Ottawa, Ontario K1P 6B9	ph: 613-747-5544 800-463-5091 fax: 613-747-6264 e-mail: info@cwc.ca web site: www.cwc.ca
FINA	Fédération Internationale de Natation Amateur Avenue de l'Avant-Poste No4 1005 Lausanne, Switzerland	ph: (+4121) 310-47-10 fax: (+4121) 312-66-10 e-mail: publications@fina.org web site: www.fina.org
HI	Hydronics Institute Division of GAMA P.O. Box 218 Berkeley Heights, NJ 07922-0218, USA *The Hydronics Institute was formally merged into GAMA in 2004*	ph: 866-408-3831 908-464-8200 fax: 908-464-7818 e-mail: publications@gamanet.org web site: www.gamanet.org

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HRAI	Heating, Refrigerating and Air-Conditioning Institute of Canada 2800 Skymark Avenue, Building 1, Suite 201 Mississauga, Ontario L4W 5A6	ph: 905-602-4700 800-267-2231 fax: 905-602-1197 e-mail: hraimail@hrai.ca web site: www.hrai.ca
HVI	Home Ventilating Institute 1000 N. Rand Rd., Suite 214 Wauconda, IL 60084, USA	ph: 847-526-2010 fax: 847-526-3993 e-mail: hvi@hvi.org web site: www.hvi.org
IESNA	Illuminating Engineering Society of North America 120 Wall Street, Floor 17 New York, NY 10005, USA	ph: 212-248-5000 e-mail: info@iesna.net web site: www.iesna.org
IRC	Institute for Research in Construction National Research Council Canada Building M-23A 1200 Montreal Road Ottawa, Ontario K1A 0R6	ph: 613-993-9960 fax: 613-952-4040 e-mail: codes@nrc-cnrc.gc.ca web site: www.nationalcodes.ca
ISO	International Organization for Standardization *Orders for ISO Standards and ISO publications should be addressed to* Standards Council of Canada 270 Albert Street, Suite 200 Ottawa, Ontario K1P 6N7	ph: 613-238-3222 fax: 613-569-7808 e-mail: info@scc.ca web site: www.scc.ca
HUD	U.S. Department of Housing and Urban Development *HUD established HUD USER as the primary source of US government technical housing publications* HUD USER P.O. Box 23268, Washington, DC 20026-3268, USA	ph: 202-708-3178 800-245-2691 fax: 202-708-9981 TTY: 800-927-7589 E-mail: helpdesk@huduser.org web site: www.huduser.org
MAH	Ontario Ministry of Municipal Affairs and Housing *Orders for the 2006 Building Code Compendium should be addressed to* Publications Ontario 880 Bay St., 1st Floor Toronto, Ontario M7A 1N8	ph: 416-326-5300 800-668-9938 fax: 416-325-3407 TTY: 416-325-3408 web site: www.publications.gov.on.ca
MOE	Ontario Ministry of the Environment 135 St Clair Avenue West Toronto, Ontario M4V 1P5	ph: 416-323-4321 fax: 416-323-4564 web site: www.ene.gov.on.ca
NFPA	National Fire Protection Association *Orders for NFPA publications should be addressed to* 11 Tracy Drive Avon, MA 02322, USA	ph: 617-770-3000 fax: 508-895-8301 e-mail: custserv@nfpa.org web site: www.nfpa.org
NLGA	National Lumber Grades Authority #302 -960 Quayside Drive New Westminster, BC V3M 6G2	ph: 604-524-2393 fax: 604-524-2893 e-mail: info@nlga.org web site: www.nlga.org

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NRCan	Natural Resources Canada Office of Energy Efficiency 580 Booth St. 18th floor Ottawa, Ontario K1A 0E4	ph: 613-995-2943 800-387-2000 TTY: 613-996-4397 e-mail: esinfo@nrcan.gc.ca web site: www.nrcan-rncan.gc.ca
NSF	NSF International *Orders for NSF publications should be addressed to:* NSF Bookstore 777 East Eisenhower Parkway Ann Arbor, MI 48108, USA	ph: 800-699-9277 fax: 734-913-3946 e-mail: techstreet.service@thomson.com web site: www.nsf.org
SMACNA	Sheet Metal and Air Conditioning Contractors National Association Inc. 4201 Lafayette Center Drive Chantilly Virginia 20151-1209, USA	ph: 703-803-2980 fax: 703-803-3732 e-mail: info@smacna.org web site: www.smacna.org
TC	Transport Canada 330 Sparks Street Ottawa, Ontario K1A 0N5	ph: 613-990-2309 fax: 613-954-4731 TTY: 888-675-6863 web site: www.tc.gc.ca
TPIC	Truss Plate Institute of Canada *The TPIC "Truss Design Procedures and Specifications for Light Metal Plate Connected Wood Trusses" is available on-line at the TPIC web site at:* ***www.tpic.ca***	
UL	Underwriters Laboratories Inc. *Orders for UL standards should be addressed to:* COMM 2000 1414 Brook Drive Downers Grove, IL 60515	ph: 888-853-3503 fax: 888-853-3512 e-mail: sales@comm-2000.com web site: www.ul.com
ULC	Underwriters' Laboratories of Canada 7 Underwriters Road Toronto, Ontario M1R 3B4 *ULC publications are available from the ULC Online Store and from Orderline (web site:* ***www.orderline.com****)*	ph: 866-937-3852 fax: 613-231-5977 e-mail: publications@ca.ul.com web site: www.ulc.ca

A-3 Application of Part 3.

In applying the requirements of this Part, it is intended that they be applied with discretion to buildings of unusual configuration that do not clearly conform to the specific requirements, or to buildings in which processes are carried out which make compliance with particular requirements in this Part impracticable. The definition of "building" as it applies to this Code is general and encompasses most structures, including those which would not normally be considered as buildings in the layman's sense. This occurs more often in industrial uses, particularly those involving manufacturing facilities and equipment that require specialized design that may make it impracticable to follow the specific requirements of this Part. Steel mills, aluminum plants, refining, power generation and liquid storage facilities are examples. A water tank or an oil refinery, for example, has no floor area, so it is obvious that requirements for exits from floor areas would not apply. Requirements for structural fire protection in large steel mills and pulp and paper mills, particularly in certain portions, may not be practicable to achieve in terms of the construction normally used and the operations for which the space is to be used. In other portions of the same building, however, it may be quite reasonable to require that the provisions of this Part be applied (e.g., the office portions). Similarly, areas of industrial occupancy which may be occupied only periodically by service staff, such as equipment penthouses, normally would not need to have the same type of exit facility as floor areas occupied on a continuing basis.

Fire Fighting Assumptions.

The requirements of this Part are based on the assumption that fire fighting capabilities are available in the event of a fire emergency. These fire fighting capabilities may take the form of a paid or volunteer public fire department or, in some cases, a private fire brigade. If these fire fighting capabilities are not available, additional fire safety measures may be required.

Fire fighting capability can vary from municipality to municipality. Generally, larger municipalities have greater fire fighting capability than smaller ones. Similarly, older, well established municipalities may have better fire fighting facilities than newly formed or rapidly growing ones. The level of municipal fire protection considered to be adequate will normally depend on both the size of the municipality (i.e., the number of buildings to be protected) and the size of buildings within that municipality. Since larger buildings tend to be located in larger municipalities, they are generally, but not always, favoured with a higher level of municipal protection.

Although it is reasonable to consider that some level of municipal fire fighting capability was assumed in developing the fire safety provisions in Part 3, this was not done on a consistent or defined basis. The requirements in the Code, while developed in the light of commonly prevailing municipal fire protection levels, do not attempt to relate the size of building to the level of municipal protection. The responsibility for controlling the maximum size of building to be permitted in a municipality in relation to local fire fighting capability rests with the municipality. If a proposed building is too large, either in terms of floor area or building height, to receive reasonable protection from the municipal fire department, fire protection requirements in addition to those prescribed in this Code, may be necessary to compensate for this deficiency. Automatic sprinkler protection may be one option to be considered.

The municipality may, in light of its fire fighting capability, elect to introduce zoning restrictions to ensure that the maximum building size is related to available municipal fire protection facilities. This is, by necessity, a somewhat arbitrary decision and should be made in consultation with the local fire fighting service, who should have an appreciation of their capability to fight fires.

The requirements of Subsection 3.2.3. are intended to prevent fire spread from thermal radiation assuming there is adequate fire fighting available. It has been found that periods of from 10 to 30 minutes usually elapse between the outbreak of fire in a building that is not protected with an automatic sprinkler system and the attainment of high radiation levels. During this period, the specified spatial separations should prove adequate to inhibit ignition of an exposed building face or the interior of an adjacent building by radiation. Subsequently, however, reduction of the fire intensity by fire fighting and the protective wetting of the exposed building face will often be necessary as supplementary measures to inhibit fire spread.

In the case of a building that is sprinklered, the automatic sprinkler system should control the fire to an extent that radiation to neighbouring buildings should be minimal. Although there will be some radiation effect on a sprinklered building from a fire in a neighbouring building, the internal sprinkler system should control any fires that might be ignited in the building and thereby minimize the possibility of the fire spreading into the exposed building. NFPA 80A, "Recommended Practice for Protection of Buildings from Exterior Fire Exposures", provides additional information on the possibility of fire spread at building exteriors.

The water supply requirements for fire protection installations depend on the requirements of any automatic sprinkler installations and also on the number of fire streams that may be needed at any fire, having regard to the length of time the streams will have to be used. Both these factors are largely influenced by the conditions at the building to be equipped, and the quantity and pressure of water needed for the protection of both the interior and exterior of the building must be ascertained before the water supply is decided upon. Acceptable water supplies may be a public waterworks system that has adequate pressure and discharge capacity, automatic fire pumps, pressure tanks, manually controlled fire pumps in combination with pressure tanks, gravity tanks, and manually controlled fire pumps operated by remote control devices at each hose station. (See also A-3.2.5.8. Water Supply for Fire-Fighting)

A-3.1.2. Use Classification.

The purpose of classification is to determine which requirements apply. This Code requires classification in accordance with every major occupancy for which the building is used or intended to be used. Where necessary, an application clause has been inserted in this Part to explain how to choose between the alternative requirements that multiple occupancy classification may present.

A-3.1.2.1.(1) Major Occupancy Classification.

The following are only examples of the major occupancy classifications described in Table 3.1.2.1. To ensure the correct classification, refer to the definitions for each occupancy in Part 1 of Division A.

Group A, Division 1
- Motion picture theatres
- Opera houses
- Television studios admitting a viewing audience
- Theatres, including experimental theatres

Group A, Division 2
- Art galleries
- Auditoria
- Bowling alleys
- Child care facility
- Churches and similar places of worship
- Clubs, nonresidential
- Community halls
- Courtrooms
- Dance halls
- Exhibition halls (other than classified in Group E)
- Gymnasia
- Lecture halls
- Libraries
- Licensed beverage establishments
- Museums
- Passenger stations and depots
- Recreational piers
- Restaurants
- Schools and colleges, nonresidential
- Undertaking premises

Group A, Division 3
- Arenas
- Indoor swimming pools
- Rinks

Group A, Division 4
- Amusement park structures (not elsewhere classified)
- Bleachers
- Grandstands
- Reviewing stands
- Stadia

Group B, Division 1
- Jails
- Penitentiaries
- Police stations with detention quarters
- Prisons
- Psychiatric hospitals with detention quarters
- Reformatories with detention quarters

Group B, Division 2
- Facilities for developmentally handicapped residents
- Homes for the aged
- Hospitals
- Infirmaries
- Long term care
- Nursing homes
- Psychiatric hospitals without detention quarters
- Reformatories without detention quarters
- Sanatoria without detention quarters

Group B, Division 3 (See also Sentence 3.1.2.5.(1).)
- Children's custodial homes
- Convalescent homes
- Group homes for developmentally handicapped residents
- Residential care facilities
- Sanatoria without detention quarters

Group C
- Apartments
- Boarding houses
- Camps for housing workers
- Clubs, residential
- Colleges, residential
- Convents
- Dormitories
- Group homes
- Halfway houses, drug and alcohol treatment
- Hostels
- Hotels
- Houses
- Lodging houses
- Monasteries

Group C (continued)

- Motels
- Open and semi-secure detention for youth
- Recreational camps
- Rooming houses
- Schools, residential
- Shelters for homeless
- Shelters for women

Group D

- Banks
- Barber and hairdressing shops
- Beauty parlours
- Dental offices
- Dry cleaning establishments, self-service, not using flammable or explosive solvents or cleaners
- Laundries, self-service
- Medical offices
- Offices
- Police stations without detention quarters
- Radio stations
- Small tool and appliance rental and service establishments

Group E

- Department stores
- Exhibition halls
- Markets
- Restaurants with an occupant load not more than 30 persons consuming food and drink
- Shops
- Stores
- Supermarkets

Group F, Division 1

- Bulk plants for flammable liquids
- Bulk storage warehouses for hazardous substances
- Cereal mills
- Chemical manufacturing or processing plants
- Distilleries
- Dry cleaning plants using flammable or explosive solvents or cleaners
- Feed mills
- Flour mills
- Grain elevators
- Lacquer factories
- Paint, varnish and pyroxylin product factories
- Rubber processing plants
- Spray painting operations

Group F, Division 2

- Aircraft hangars
- Cold storage plants
- Dry cleaning establishments not using flammable or explosive solvents or cleaners
- Electrical substations
- Freight depots
- Helicopter landing areas on roofs
- Laboratories
- Laundries, except self-service
- Planing mills
- Printing plants
- Repair garages
- Self-service storage buildings
- Service stations
- Storage rooms
- Television studios not admitting a viewing audience
- Tire storage
- Warehouses
- Woodworking factories

Group F, Division 3

- Creameries
- Laboratories
- Power plants
- Storage garages, including open air parking garages
- Storage rooms
- Warehouses

A-3.1.3.2.(3) Food Premises.

This requirement is intended to apply to facilities where food is being prepared, stored, processed or served, such as restaurants, commercial kitchens, cafeterias, camps, milk plants and bakeries.

A-3.1.4.2.(1)(c) Thermal Barrier in Combustible Construction.

e_1 Any thermal barrier that is accepted under the requirements of Sentence 3.1.5.12.(2) for noncombustible construction is also acceptable for combustible construction.

A-3.1.4.3.(1) Wire and Cable Equivalence.

e_1 Electrical wires and cables that conform to the requirements of Sentence 3.1.5.18.(1) are deemed to satisfy the requirements of Sentence 3.1.4.3.(1).

A-3.1.4.3.(1)(b)(i) Raceway Definition.

The term raceway is defined in Ontario Electrical Safety Code and includes both rigid and flexible conduit.

A-3.1.5.4.(1) Skylight Spacing.

The minimum spacing dimensions for skylight assemblies are based on the distance that flame must travel along a flat ceiling surface. If ceilings have projecting beams or other features that would increase the distance the flame would have to travel along the surface, the distances specified may be measured accordingly.

A-3.1.5.5.(1) Combustible Elements.

These requirements allow for exterior wall assemblies incorporating combustible elements on buildings of noncombustible construction. Since the tested assemblies must be representative of actual construction, the performance of the entire assembly is assessed with regard to its ability to resist flame propagation up the outside of a building. The thermal barrier protection limits the impact of an interior fire on the wall assembly.

These requirements, in combination, thus allow for wall assemblies containing both combustible cladding elements and non-loadbearing combustible framing members. These wall assemblies can be used as infill or panel type walls between structural elements, or attached directly to a loadbearing noncombustible structural system. These requirements, however, do not waive others specifically intended for the protection of combustible insulation in buildings of noncombustible construction.

These requirements are predicated upon the assumption that the manufacturing process and field installation procedure are both carried out under an independent quality assurance program designed to confirm that the product and its application are consistent with the system as tested.

A-3.1.5.5.(2) Flame Spread Distance.

The maximum flame spread distance refers to the distance between the top of the opening and the highest observable instance of flaming along the wall assembly and thus allows intermittent flaming to a height of 5 m above the opening.

A-3.1.5.5.(3) Heat Flux Measurement.

The heat flux to the assembly referred to in Sentence 3.1.5.5.(3) is the maximum one-minute averaged heat flux measured by transducers located 3.5 m above the top of the opening. The intent of this criterion is to limit the spread of fire on the wall assembly to a height of 3.5 m above the opening.

Since the exact location of flaming on the exterior surface of a wall assembly can be influenced by the presence of furring strips, cavities, etc., in the assembly, which could channel the flame away from a heat flux transducer, sufficient transducers should be located at any given height to intercept any flaming that could occur along the assembly. The exact position of the transducers will depend on the location of cavities, joints, studs or furring strips in the assembly.

A-3.1.5.12.(2)(e) Foamed Plastic Insulation Protection.

The standard fire exposure temperature in CAN/ULC-S101-M, "Standard Methods of Fire Endurance Tests of Building Construction and Materials", is the same as in CAN4-S124-M, "Standard Method of Test for the Evaluation of Protective Coverings for Foamed Plastic". A thermal barrier that, when tested in conformance with CAN/ULC-S101-M, "Standard Methods of Fire Endurance Tests of Building Construction and Materials", will not exceed an average temperature rise of 140°C on its unexposed face after a period of 10 min satisfies this requirement.

A-3.1.5.17.(1) Wire and Cable Flammability.

In regulating the flammability characteristics of optical fibre cables and electrical wires and cables installed in a building, it is intended that the requirements of this Sentence and of other similar Sentences in the Code apply to wires and cables that are essentially a part of the distribution systems for power or communications. These distribution systems will normally include branch circuits that terminate at an outlet box in the space to be served and, at that location, cable terminators or plugs for individual items of equipment will be plugged in.

A-3.1.8.1.(1)(a) Fire Separation Continuity.

The continuity of a fire separation where it abuts against another fire separation, a floor, a ceiling or an exterior wall assembly is maintained by filling all openings at the juncture of the assemblies with a material that will ensure the integrity of the fire separation at that location.

A-3.1.8.1.(1)(b) Barrier to Control Smoke Spread.

Although a fire separation is not always required to have a fire-resistance rating, the fire separation should act as a barrier to the spread of smoke and fire until some response is initiated. If the fire-resistance rating of a fire separation is waived on the basis of the presence of an automatic sprinkler system, it is intended that the fire separation will be constructed so that it will remain in place and act as a barrier against the spread of smoke for a period of time until the sprinklers have actuated and controlled the fire.

A-3.1.8.1.(2) Installation of Closures.

Although there is no explicit performance statement in the Code that means of egress should be free of smoke, it is the intent that during the period when occupants are using a means of egress to evacuate from a floor area, the smoke contamination should not reach levels that would inhibit movement to the exit. This is particularly critical for persons with disabilities, who may not move at the same rate as other persons and who could be more susceptible to the effects of smoke contamination. NFPA 80, "Standard for Fire Doors and Fire Windows", requires that a fire door protecting a means of egress be designed to minimize the possibility of smoke passing through the opening.

Although self-closing devices are not required for all doors in a fire separation (see Article 3.1.8.11.), it is assumed that in a fire situation every door in a fire separation is closed. Article 3.3.3.5. prohibits grilles and similar openings for certain fire separations in hospitals and nursing homes.

Although fire dampers that release on the fusion of a fusible link will help to control the spread of fire, a substantial quantity of smoke could have passed through the opening before that event. They are frequently located below the upper levels of a room and so the release of the fusible link of the fire damper that protects an opening will be delayed until the temperature at the level of the opening becomes high enough to fuse the link.

Similar concern has to be considered for other closure devices that are permitted to remain open on fusible links, and their location should be restricted in accordance with NFPA 80, "Standard for Fire Doors and Fire Windows", and this Code, except where their installation in another location will not allow the products of combustion to spread into means of egress.

A-3.1.8.9.(5) Fire Damper Access.

It is intended that an access door be provided in the duct and, if the duct is enclosed with an architectural finish, that a second access door be provided through that finish.

A-3.1.8.16.(1) Wired Glass and Glass Block.

The permission to include wired glass and glass block in doors and fire separations between an exit and the adjacent floor area does not permit the inclusion of those items in fire separations between exits and other parts of the building that are not included in the floor area. Examples include other exit facilities and vertical service spaces, including those used for building services and elevator hoistways.

A-3.1.8.17.(1) Fire-Protection Rating for Doors.

The provisions in Articles 3.1.8.15., 3.1.8.16. and 3.1.8.17. do not waive a requirement for a door to have a fire-protection rating. To achieve this rating in a door test, it may be necessary to limit the area of glass in the door. If this area is less than the area limits of Article 3.1.8.16., it is the governing criterion. Conversely, if the area limits of Article 3.1.8.16. are less than the area required to achieve a fire-protection rating, then the area limits of this Article govern.

A-3.1.9. Service Penetrations.

In the application of Subsection 3.1.9., a building service is considered to penetrate an assembly if it passes into or through the assembly. In some situations a service item enters an assembly through a membrane at one location, runs within the assembly, and then leaves the assembly through a membrane at another location.

A-3.1.9.1.(1)(b) Service Penetration.

The intention behind the use of the term "tightly fitted" is to reinforce that there are to be no gaps between the building service and the membrane it penetrates. A typical means of fire stopping for a service penetration through a concrete slab or wall is "cast in place" concrete.

A-3.1.9.2.(1) Penetration of Fire Separations by Electrical Boxes.

The provisions dealing with outlet boxes assume size, quantities and concentrations of partial depth penetrations that would not significantly affect the fire resistance of the assembly, including the temperature rise on the unexposed side of a wall. Sentence 3.1.9.2.(1) is not intended to allow large electrical distribution and control boxes to be recessed into an assembly required to have a fire-resistance rating unless they were incorporated in the assembly at the time of testing.

A-3.1.10.2.(4) Firewall Construction.

Inherent in the use of a firewall is the intent that this specialized wall construction provide the required fire-resistance rating while also being designed to resist physical damage - arising out of normal use - that would compromise the rating of the assembly. Traditionally, this has been accomplished by prescribing the use of noncombustible materials, which was, in fact, restricted to concrete or masonry. Sentences 3.1.10.2.(3) and (4) are intended to retain both of the characteristics of firewalls, while permitting greater flexibility in the use of materials and designs. The fire-resistance rating and damage protection attributes of a firewall may be provided by a single fire- and damage-resistant material such as concrete or masonry, by a fire- and damage-resistant membrane on a structural frame, or by separate components - one that provides the fire-resistance rating and another one that protects the firewall against damage.

If the firewall is composed of separate components, the fire-resistance rating of the fire-resistive component needs to be determined for this assembly on its own. In addition, if the damage protection component is physically attached to the fire-resistive component (for example, as a sacrificial layer), then, for the purposes of determining the overall performance of the assembly, it is also necessary to determine through testing whether failure of the damage protection component during a fire affects the performance of the fire-resistive component.

A-3.1.11.5.(1) Fire Stopping in Combustible Construction.

Combustible construction referred to in Sentence 3.1.11.5.(1) includes all types of construction that do not comply with the requirements for noncombustible construction. All the elements within the concealed space can be combustible, unless required to be of noncombustible materials (e.g., certain categories of pipework and ducts), but the value of the flame-spread rating of the combustible materials determines the permitted extent of the concealed space between fire stops. The materials to be considered include all construction materials regulated by this Code, including the framing and building services that are located in the concealed space.

A-3.1.13.2.(2) Folding Partition.

Folding partitions used to divide a space into separate rooms are not considered as doors for the purposes of this Sentence.

A-3.2.1.1.(3)(a) Mezzanine Area.

The permitted area of the mezzanine for the purposes of determining the allowable percentage is to be based on the open area of the floor of the space in which the mezzanine is located. The Code does not restrict the enclosing of space below the mezzanine but the enclosed area must be deducted from the area of the overall space before applying the percentage allowance.

A-3.2.1.1.(9) Accessible Service Space.

These service spaces are often referred to as interstitial spaces and are designed to allow service personnel to enter and undertake maintenance or installation within the space. Catwalks or flooring are usually included to provide a walking or access surface. Even when flooring is included, it is not intended that the interstitial space should be considered as a storey for the purposes of the Code unless the space is used for purposes other than servicing or the storage of materials and equipment to be used for building services within that space.

A-3.2.2.2.(1) Special and Unusual Structures.

Examples of structures which cannot be identified with the descriptions of buildings in Articles 3.2.2.20. to 3.2.2.83. include grain elevators, refineries and towers. Publications that may be consulted to establish good engineering practice for the purposes of Article 3.2.2.2. include the NFPA Fire Protection Handbook, Factory Mutual Data Sheets, and publications of the Society for Fire Protection Engineering.

A-3.2.2.18.(1) Sprinkler Extent.

It is not the intent of Article 3.2.2.6. and Sentences 3.2.2.4.(1) and (2) to require the installation of an automatic sprinkler system throughout all storeys of a building regardless of the options in Articles 3.2.2.20. to 3.2.2.83. in order to construct one or more storeys without the installation of sprinklers.

Furthermore, unlike the model National Building Code, it is not the intent of this Code to require an automatic sprinkler system in storeys below a storey where an automatic sprinkler system is required. Similarly, if the uppermost storey or storeys of a building can be constructed without the installation of an automatic sprinkler system it is not necessary that an automatic sprinkler system required in a lower storey be extended into the upper storey or storeys.

A-3.2.3.1.(4) Spatial Separation Design.

In the application of Sentences 3.2.3.1.(3) and (4), it is intended that Sentence (3) be used first to establish the basic requirements for the exterior wall in terms of fire-resistance rating, type of construction and type of cladding. The percentage of unprotected openings determined from the application of Sentence (3) would be unnecessarily restrictive if the actual unprotected openings occur in a plane that is set back from the front of the building face.

Sentence (4) applies to the calculation of the allowable percentage of unprotected openings based upon projection onto a plane that is in front of all unprotected openings. The application of these two Sentences is shown in Figure A-3.2.3.1.(4). The modifications permitted by Article 3.2.3.11. would be applied, if applicable, to the area of unprotected openings derived from Sentence (4).

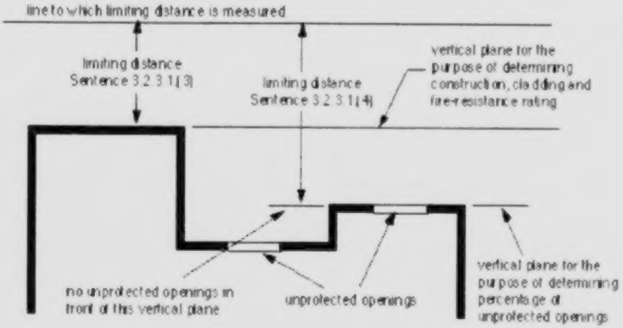

line to which limiting distance is measured
limiting distance Sentence 3.2.3.1.(3)
limiting distance Sentence 3.2.3.1.(4)
vertical plane for the purpose of determining construction, cladding and fire-resistance rating
no unprotected openings in front of this vertical plane
unprotected openings
vertical plane for the purpose of determining percentage of unprotected openings

Figure A-3.2.3.1.(4)
Spatial Separation Design

A-3.2.3.7.(9) Noncombustible Cladding.

The requirement for the exterior protection of foamed plastic insulation in an exterior wall of a building is intended to limit the exposure of the insulation to flames, thereby reducing the possibility of increased radiation to an exposed building. The permission to use combustible components conforming to Article 3.1.5.5. does not waive the requirements for noncombustible construction or noncombustible cladding in Sentences 3.2.3.7.(1) and (4).

A-3.2.3.12.(1) Increased Openings Permitted.

No increase of the maximum area of unprotected openings in an exposing building face should be applied until the requirements of Article 3.2.3.7. have been satisfied in determining the construction of the exposing building face.

A-3.2.3.14. Wall Exposed to Another Wall.

The intent of this Article is to ensure that the control of fire spread by the interior fire separations between adjacent fire compartments is not defeated through the spread of fire by thermal radiation outside the building. Minimum separations (D_o) are specified between unprotected openings in separate fire compartments of the building where the exterior faces of these compartments are deemed to expose each other to a thermal radiation hazard. This situation may arise where the angle, θ, between the intersecting planes of the exposing building faces is less than 135° and both of these faces have unprotected openings. The exterior walls of the fire compartments do not have to intersect in order to apply Article 3.2.3.14. Rather, the critical factor is the angle, θ, between the planes formed by the exterior walls. Examples are shown in Figures A-3.2.3.14.A., A-3.2.3.14.B. and A-3.2.3.14.C. of situations which would be addressed by this Article.

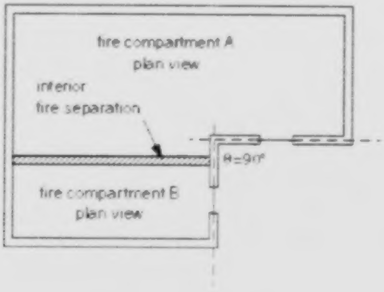

fire compartment A
plan view
interior
fire separation
θ=90°
fire compartment B
plan view

Figure A-3.2.3.14.A.
Openings in Walls at a Right-angle Corner

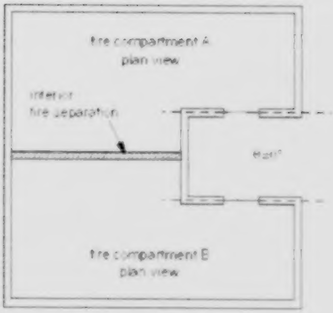

fire compartment A
plan view
interior
fire separation
θ=0°
fire compartment B
plan view

Figure A-3.2.3.14.B.
Openings in Walls which are Parallel to One Another

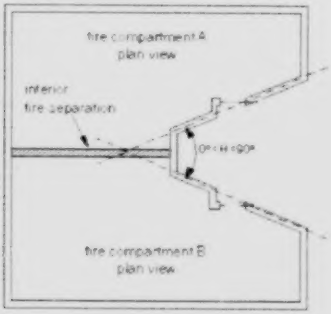

fire compartment A
plan view
interior
fire separation
0°<θ<90°
fire compartment B
plan view

Figure A-3.2.3.14.C.
Openings in Walls with an Included Angle of 45 deg.

The exterior unprotected openings in the fire compartments are not deemed to expose each other to a thermal radiation hazard if:

- the angle formed between the planes of the exposing building faces is 135° or more, or
- the fire compartments are sprinklered.

In order to apply sentence 3.2.3.14.(1), both of the exterior walls must have unprotected openings. Sentence (1) does not apply where the exterior wall of only one fire compartment has unprotected openings. The separation of exterior unprotected openings in adjacent fire compartments is not required if the openings in both compartments are in the same plane (θ = 180°).

Sentence 3.2.3.14.(2) requires the exterior walls of each fire compartment within the distance, D_o to have a fire-resistance rating. The fire-resistance rating must be at least equal to the required interior separation between the fire compartments. Thermal radiation from an opening is substantially reduced at angles less than 45° from the plane of the unprotected opening. This may be shown schematically in Figure A-3.2.3.14.D.:

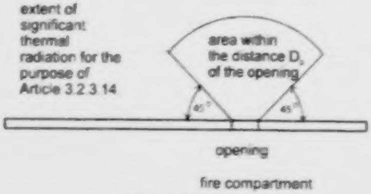

extent of significant thermal radiation for the purpose of Article 3.2.3.14
area within the distance D_o of the opening
45°
45°
opening
fire compartment

Figure A-3.2.3.14.D
Thermal Radiation

Sentence 3.2.3.14.(2) requires the portion of an exterior wall (containing an unprotected opening) of any other fire compartment that falls within the shaded area of the Figure above to have a fire-resistance rating.

Figures A-3.2.3.14.E. and A-3.2.3.14.F. illustrate the application of Sentence 3.2.3.14.(2) where the exterior walls of 2 fire compartments contain unprotected openings and the planes of the openings meet at 90°.

In order to apply Sentence 3.2.3.14.(2), the fire-resistance rating of each of the exterior walls exposed to significant thermal radiation at all angles of less than 135° within the distance, D_o, from the opening in the opposite wall must be investigated. In the example shown in Figure A-3.2.3.14.E., the effect of Opening A on the exterior wall of Fire Compartment "B" must be investigated as follows.

In this example, a portion of the exterior wall of Fire Compartment "B" happens to fall within the distance, D_o, and within the angle, θ less than 135°. However, only that part of the wall which is shown shaded is required to have a fire-resistance rating.

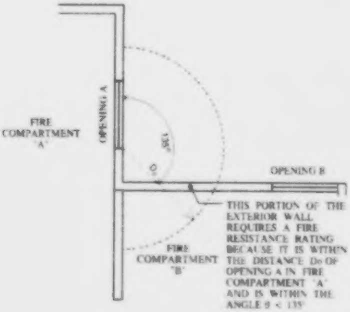

FIRE
COMPARTMENT
"A"
OPENING A
135°
D°
OPENING B
THIS PORTION OF THE EXTERIOR WALL REQUIRES A FIRE RESISTANCE RATING BECAUSE IT IS WITHIN THE DISTANCE Do OF OPENING A IN FIRE COMPARTMENT "A" AND IS WITHIN THE ANGLE θ < 135°
FIRE
COMPARTMENT
"B"

Figure A-3.2.3.14.E.
Thermal Radiation

A-3.2.4. Fire Alarm System.

The term "fire alarm system" used in this Subsection applies to fire alarm systems with or without voice communication capability.

A-3.2.4.4.(1) Single Stage Fire Alarm System.

This requirement, in combination with Article 3.2.4.22., is intended to allow for the provision of voice communication capability as an integral part of a single stage fire alarm system.

A-3.2.4.4.(2) Two Stage Fire Alarm System.

This requirement, in combination with Article 3.2.4.22., is intended to allow for the provision of voice communication capability as an integral part of a 2 stage fire alarm system.

A-3.2.4.4.(2)(c) Fire Alarm Alert Signal.

In a 2 stage fire alarm system described in Sentence 3.2.4.4.(2), the alert signal may be transmitted to audible signal devices in designated locations or to audible signal devices throughout the building. If actuated, the second stage alarm signal in a 2 stage fire alarm system may sound throughout all zones in the building. All manual station key switches would typically initiate the alarm signal.

Sentence 3.2.4.4.(2) also allows the implementation of a "zoned 2-stage" sequence of operation, whereby the alarm signal sounds in the zone of key switch actuation (and perhaps in the adjacent zones, which may be the storey above and the storey below) and the alert signal sounds throughout the rest of the building. This sequencing would be created automatically by the fire alarm control unit.

The key or special device referred to in Clause 3.2.4.4.(2)(c) should be immediately available to all persons on duty who have been given authority to sound an alarm signal.

A-3.2.4.6.(2) Access to Silencing Switches.

This requirement is intended to prevent easy access to silencing switches. The satisfactory operation of a fire alarm system to alert the occupants of a building to an emergency is predicated on the assumption that the alarm signal will be silenced only after responsible staff have verified that no emergency exists.

A-3.2.4.7.(4) Fire Department Notification.

In some jurisdictions, the fire department may utilize, or have available, a municipal fire alarm system intended for receiving notification by means of a direct connection. It is also intended that a proprietary central station used by a university campuses or similar sites comply with Sentence (4).

A-3.2.4.7.(5)(b) Emergency Telephone Number.

In many municipalities an emergency telephone number, for example 911, is used for all emergency services and it is preferable to post that number.

A-3.2.4.8.(2) Fire Alarm Zones.

Alarm initiating devices referred to in this Sentence include fire detectors, waterflow switches and manual pull stations. If a room or space in a building extends through more than one storey of the building, as in the case of multi-level dwelling units and machinery rooms, judgment must be exercised in the zoning and annunciation of the fire detectors in that room or space. In general, the lowest storey on which access is provided into the room or space should be indicated on the annunciator to avoid unnecessary delays for the responding fire fighters. Consideration should also be given to the use of numbers or letters on the annunciator that correspond to those used in the building elevators.

A-3.2.4.8.(7) Indicator Devices.

It is permissible to install the fire alarm control unit in close proximity to the building entrance to meet the requirement for an annunciator. All signals required for the annunciator must be present at the control unit. In systems that include both control unit and annunciator, the signals must be routed to the annunciator through the control unit and the same functionality must be available at the control unit for operation and maintenance functions.

A-3.2.4.9.(2)(f) Supervision for Fire Pumps.

Specific electrical supervision for fire pumps is stated in NFPA 20, "Standard for the Installation of Centrifugal Fire Pumps", which is referenced in NFPA 13, "Standard for the Installation of Sprinkler Systems".

A-3.2.4.11.(1) Smoke Detector Location.

In the design and installation of the smoke detection system, consideration must be given to all features which could have a bearing on the location and sensitivity of the detectors, including ceiling height, sloped ceilings, diffusion from air conditioning and ventilating currents, obstructions, baffles, and other pertinent physical configurations that might interfere with the proper operation of the system.

A-3.2.4.11.(3) Visible Signals.

If staff located in each zone or compartment can see each sleeping room door, visible signals may be located above each door. If staff cannot see every door, it is intended that the visible signals be provided at the location where the staff are normally in attendance. The audible signal is intended to alert staff of the need to check the visible signals.

A-3.2.4.17.(1) Manual Pull Station.

Only one manual pull station need be provided near a group of doors serving as a principal entrance or as a single exit facility.

A-3.2.4.19. Acoustic Measurement and Terminology.

The following notes on acoustic measurement and terminology are intended to assist in the application of the requirements for audibility of fire alarm system sounding devices.

The background or ambient measurement should be a spatial averaged A-weighted equivalent sound level measured for 60 s. This can be obtained using an integrating sound level meter with the integration time set to 60 s. During the measurement period the meter should be slowly moved about so as to sample the space uniformly but coming no closer than 0.5 m from any solid wall, floor or ceiling. Alternatively, measurements can be made at 3 or more positions throughout the space and an energy average calculated.

The measurement of the alarm level depends on the type of alarm signal. If the signal is a continuous signal from a bell or siren, the spatial averaged A-weighted equivalent sound level should be obtained. The integration time should be long enough to obtain a reasonable spatial average of the space, but not less than 10 s.

If the alarm has a temporal pattern, then the A-weighted sound level should be measured using the 'fast' time constant during the 'on' part of the cycle. In this situation it is not appropriate to use an integrating sound level meter. Since the duty cycle of the alarm is only 37.5% at best, that type of meter would give a reading that is 4 or more decibels lower than the level while the alarm is 'on'. A number of measurements should be made about the space in question and the average value used to obtain a good spatial representation. Strictly speaking, the energy average of the measurements should be used; however, the frequency spectrum associated with most alarms is of a type that should give little variation about the space. If the measured levels don't vary by more than 2 to 3 dB, then an arithmetic average rather than an energy average can be used.

Glossary of Acoustical Terms

Audible: A signal is usually considered to be clearly audible if the A-weighted sound level exceeds the level of ambient noise by 15 dB or more.

Awakening threshold: The level of sound that will awaken a sleeping subject 50% of the time.

A-weighted: A frequency weighting network which emphasizes the middle frequency components similar to the response of the human ear. The A-weighted sound level correlates well with subjective assessment of the disturbing effects of sounds. The quantity is expressed in dBA.

Masked threshold: The level of sound at which a signal is just audible in ambient noise.

Sound level: A sound pressure level obtained using a signal to which a standard frequency-weighting has been applied.

Sound pressure: A fluctuating pressure superimposed on the static pressure by the presence of sound. The unqualified term means the root-mean-square sound pressure. In air, the static pressure is barometric pressure.

e_1 Sound pressure level: Ten times the common logarithm of the ratio of the square of the sound pressure under consideration to the square of the standard reference pressure of 20 MPa. The quantity obtained is expressed in decibels.

A-3.2.4.19.(1) Alert and Alarm Signals.

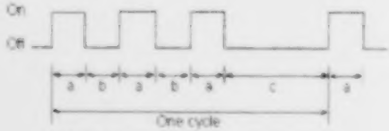
Alert signals are part of a 2 stage fire alarm system. The intent of the first, alert, stage is to notify persons in authority of a potential threat to building occupants. If a continuously staffed location is available, the alert signal can be restricted to that location.

A-3.2.4.19.(2) Alarm Signal Temporal Pattern.

The temporal pattern of an alarm signal relates to the time during which the signal is produced and the intervals between the individual signal pulses. The international standard ISO 8201, "Acoustics – Audible emergency evacuation signal", includes a pattern that is becoming widely used in different countries and it is appropriate for this pattern to be adopted in Canada. The temporal pattern can be produced on most signalling devices. Most existing alarm systems can be modified, and this pattern could be phased in when the systems require modification. The characteristic of the pattern is a 3-pulse phase followed by an off phase. The 3 pulses each consist of an on phase lasting for 0.5 ± 0.05 s followed by an off phase lasting for 0.5 ± 0.05 s sounded for 3 successive on periods and then followed by an off phase lasting for 1.5 ± 0.15 s. Figure A-3.2.4.19.(2).A. indicates the pattern that is intended.

Although the diagram shows a square wave form, the wave can have other shapes that produce a similar effect.

If single stroke bells are to be used, the temporal pattern can be produced by having the bell struck three times at a rate of one stroke per second followed by an interval of 2 s of silence. Figure A-3.2.4.19.(2).B. shows the pattern that results.



Phase a: signal is on for 0.5 ± 0.05 s
Phase b: signal is off for 0.5 ± 0.05 s
Phase c: signal is off for 1.5 ± 0.15 s
Total cycle to last 4.0 ± 0.40 s

Figure A-3.2.4.19.(2).A.
Temporal Pattern for Fire Alarm Signal

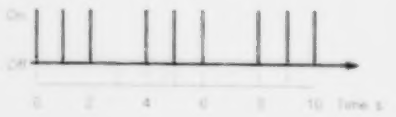


Figure A-3.2.4.19.(2).B.
Temporal Pattern imposed on a Single Stroke Bell or Chime

Note:

(1) The on phase represents the time that the striker mechanism is actuated. The sound produced by the bell or chime will continue at a level that decreases until the striker mechanism is re-actuated.

A-3.2.4.19.(3) Audibility of Alarm Systems.

It is very difficult to specify exactly what types of sound patterns are considered to be "significantly different" from one another. The intent is to ensure that there is a noticeable or measurable difference between the alert signals and the alarm signals such that it reduces the possibility of confusion.

A-3.2.4.19.(5) Residential Sound Level.

In a building in which corridors or hallways serve more than one suite or dwelling unit, there will be situations in which an audible signal device cannot be placed in the corridor or hallway to alert persons sleeping in suites and dwelling units, because the sound level in the vicinity of the device would exceed that permitted by Sentence 3.2.4.19.(4).

In these situations it will be necessary to supplement the building fire alarm system with an audible signal device in the suite or dwelling unit. These devices could be piezoelectric devices similar to the sounding units in many smoke alarms, subject to the device emitting the appropriate temporal pattern required by Sentence 3.2.4.19.(2).

The sound pressure level required in this Sentence should be measured when the suite is unfurnished and unoccupied.

A-3.2.4.19.(9) Disconnect Device for Dwelling Units.

In order to minimize the annoyance caused by false and unwanted alarms, the disconnect is intended to permit a person to silence the local audible device within the dwelling unit. At that time the person would be aware of sounds from devices in common spaces and could plan appropriate action.

A-3.2.4.19.(10) Signal Circuits.

e_1 Clause 3.2.4.19.(10)(a) permits Class A wiring, or Class B wiring with signal circuit isolators located outside of the suites, to serve audible signal devices within residential suites. Clause 3.2.4.19.(10)(b) permits a separate signal circuit to serve each suite without the need for signal circuit isolators or Class A wiring. Open circuits and Class A and Class B wiring circuits are terms defined in CAN/ULC-S524, "Installation of Fire Alarm Systems."

A-3.2.4.19.(13) Separate Signal Circuits

Sentence 3.2.4.19.(10) in combination with Sentence 3.2.4.19.(11) requires separate audible signal circuits for dwelling units. It allows the designer the option to wire the audible signal devices in a dwelling unit on an individual circuit that serves each suite only or to wire the audible signal devices in a common circuit that serves the dwelling units within the floor area and is separate from the circuit that serves the audible devices outside the dwelling unit. Compliance with either of the above two options would meet the intent of a separate circuit required in Sentence 3.2.4.19.(13).

A-3.2.4.20.(1) Visual Alarm Pattern.

CAN/ULC S526-M, "Standard for Visual Signal Appliances", published by Underwriters' Laboratories of Canada, applies to visual signalling units. This document is referenced by the most recent standard for the installation of fire alarm systems and would automatically apply. Visual signalling devices with the same temporal pattern as required for audible devices are available from some sources and they should become available in Canada. Not all units that comply with the ULC standard will have sufficient power to adequately cover large areas; care will have to be taken to specify units with adequate power when large spaces are being designed.

A-3.2.4.20.(2) Visual Signal.

If staff located in each zone or compartment can see each sleeping room door, visual signals could be located above each door. If staff cannot see every door, it is intended that the visual signals be provided at the location where the staff are normally in attendance.

A-3.2.4.21.(5) Smoke Alarm Installation.

The Electrical Code permits a smoke alarm to be installed on most residential circuits that carry lighting outlets and receptacles. It is the intent of this Code that any other item on a circuit with a smoke alarm should be unlikely to be overloaded and trip the breaker with a resultant loss of power that is not sufficiently annoying for the breaker to be restored to the on position. It is considered that an interior bathroom light or a kitchen light fulfills this intent, but that circuits restricted to receptacles do not fulfill this intent.

A-3.2.4.22.(1)(b) Voice Messages.

The concept of intelligibility expressed in Clause 3.2.4.22.(1)(b) is intended to mean that a person with average hearing and cognitive abilities is able to understand the messages that are transmitted into the space occupied by the person. The intelligibility of the message depends on the speech level, the background level, and the reverberation time of the space. ISO 7731, "Danger signals for workplaces - Auditory danger signals", addresses audibility. The standard suggests that an A-weighted sound level at least 15 dB above the ambient is required for audibility, but allows for more precise calculations using octave or ⅓ octave band frequencies to tailor the alarm signal for particular ambient noise conditions. Design of the alarm system is limited to ensuring that all areas receive an adequately loud alarm signal. If a public address system is to be used to convey instructions during an emergency, then the requirements of the system are less straightforward.

A-3.2.5.4.(1) Fire Department Access for Detention Buildings.

Buildings of Group B, Division 1 used for housing persons who are under restraint include security measures that would prevent normal access by local fire departments. These security measures include fencing around the building site, exterior walls without openings or openings which are either very small or fitted with bars, and doors that are equipped with security hardware that would prevent easy entry. These buildings would have fire fighting equipment installed and the staff would be trained to handle any small incipient fires. It is expected that appropriate fire safety planning would be undertaken in conjunction with local fire departments in order that special emergencies could be handled in a cooperative manner.

A-3.2.5.6.(1) Fire Department Access Route.

The design and construction of fire department access routes involves the consideration of many variables, some of which are specified in the requirements in the Code. All these variables should be considered in relation to the type and size of fire department vehicles available in the municipality or area where the building will be constructed. It is appropriate, therefore, that the local fire department be consulted prior to the design and construction of access routes.

A-3.2.5.7. Water Supply for Fire-Fighting.

This Article requires that an adequate water supply for fire fighting is to be provided for every building. However, farm buildings of low human occupancy under the National Farm Building Code of Canada 1995 are exempted. The water supply requirements for interior fire suppression systems such as sprinkler systems and standpipe and hose systems are contained in other standards, for example, NFPA Standard 13, "Installation of Sprinkler Systems", and NFPA Standard 14, "Installation of Standpipe and Hose Systems". This Appendix note focuses only on water supplies that are considered essential to fire fighting by fire department or other trained personnel using fire hoses.

Minimum requirements for water supply for fire fighting are relevant mainly to building sites not serviced by municipal water supply systems. For building sites serviced by municipal water supply systems where the water supply duration is not a concern, water supply flow rates at minimum pressures would be the main focus of this Appendix note. However, where municipal water supply capacities are limited, it would be necessary for buildings to have on-site supplemental water supply.

An adequate water supply for fire fighting should be an immediately available and accessible water supply with sufficient volume and/or flow to enable fire department personnel using fire hoses to control fire growth until the building is safely evacuated, prevent the fire from spreading to adjacent buildings, limit environmental impact of the fire, and provide a limited measure of property protection.

The sources of water supply for fire fighting purposes may be natural or man-made. Natural sources may include ponds, lakes, rivers, streams, bays, creeks, springs, artesian wells, and irrigation canals. Man-made sources may include aboveground tanks, elevated gravity tanks, cisterns, swimming pools, wells, reservoirs, aqueducts, tankers, and hydrants served by a public or private water system. It is imperative that such sources of water be accessible to fire department equipment under all climate conditions.

The available water supply would allow arriving fire department personnel to use the water at their discretion when entering a burning building with hose lines. During the search and evacuation operation, hose streams may be needed for fire suppression to limit fire spread. The duration of the water supply should be sufficient to allow complete search and evacuation of the building. Once the search and rescue operations are complete, additional water may be required for exposure protection or fire suppression to limit property damage.

Fire departments serving remote or rural areas often have to respond to a fire with a transportable water supply of sufficient volume for approximately 5 to 10 minutes when using one or two 38 mm hose lines. This would provide minimal hose streams allowing immediate search and rescue operations in small buildings with simple layouts but limited fire suppression capabilities, especially if a fire is already well-established.

For larger more complex buildings, an on-site water supply for fire fighting would be needed to provide an extended duration of hose stream use by the fire department to allow search and evacuation of the building, exposure protection and fire suppression. The volume of this on-site water supply would be dependent on the building size, construction, occupancy, exposure and environmental impact potential, and should be sufficient to allow at least 30 minutes of fire department hose stream use.

The recommendations of this Appendix note are predicated on prompt response by a well equipped fire department using modern fire fighting techniques, and buildings being evacuated in accordance with established building fire safety plans and fire department pre-fire plans. For buildings constructed in areas where fire department response is not expected at all or in a reasonable time, sprinkler protection should be considered to ensure safe evacuation.

Elementary and secondary schools usually have a record of well established and practiced fire safety plans which would allow complete evacuations within 4 minutes. Because of this and the inherent high level of supervision in these buildings, a reduction of the water supply for fire fighting may be considered. It is suggested that the level of reduction should be determined by the local jurisdictional authority based on the resources and response time of the fire department, and the size and complexity of the buildings.

When designing open, unheated reservoirs as sources of fire protection water, a 600 mm ice depth allowance should be included in the water volume calculations, except where local winter temperature conditions result in a greater ice depth (as typically found on local lakes or ponds). As well, make-up water supplies should be provided to maintain the design volumes, taking into account volume loss due to evaporation during drought periods.

1. Buildings not Requiring an On-Site Water Supply
   (a) A building would not require an on-site water supply for fire fighting if the building satisfies the criteria set out in Item 1(b) or Item 1(c) provided that:
      (i) the building is serviced by a municipal water supply system that satisfies Item 3(b), or
      (ii) the fire department can respond with a transportable water supply of sufficient quantity to allow them to

conduct an effective search and evacuation of the building, determined on the basis of other guidelines or standards (such as, NFPA 1231, "Standard on Water Supplies for Suburban and Rural Fire Fighting").

(b) A building would not require an on-site water supply for fire fighting where all of the following criteria are met:
   (i) the building area is 200 m^2 or less,
   (ii) the building height is 2 storeys or less,
   (iii) the building does not contain a care or detention occupancy,
   (iv) the building does not require a sprinkler system or a standpipe and hose system,
   (v) the limiting distance from the property line is at least 13 m if the building contains a high hazard industrial occupancy, and
   (vi) the building constitutes no significant environmental contamination potential due to fire.

(c) A building that exceeds 200 m^2 in building area or 2 storeys in building height and that contains a low hazard industrial occupancy may not require an on-site water supply for fire fighting if the combustible loading in the building is insignificant (such as that found in cement plants, steel stock storage sheds, etc.), as determined by the Chief Building Official.

2. Sprinklered Buildings

For sprinklered buildings, water supply additional to that required by the sprinkler systems should be provided for fire fighting using fire hoses in accordance with the hose stream demands and water supply durations for different hazard classifications as specified in NFPA 13, "Standard for the Installation of Sprinkler Systems".

3. Buildings Requiring On-Site Water Supply

(a) Except for sprinklered buildings and as required by Items 3(c) and 3(e), buildings should have a supply of water available for fire fighting purposes not less than the quantity derived from the following formula:

$$Q = K \cdot V \cdot S_{Tot}$$

where

Q = minimum supply of water in litres
K = water supply coefficient from Table 1
V = total building volume in cubic metres
S_{Tot} = total of spatial coefficient values from property line exposures on all sides as obtained from the formula:

$$S_{Tot} = 1.0 + [S_{side1} + S_{side2} + S_{side3} + \ldots \text{etc.}]$$

where

S_{side} values are established from Figure 1, as modified by Items 3(d) and 3(f), and
S_{Tot} need not exceed 2.0.

(b) Water supply flow rates should not be less than that specified in Table 2. Where the water supply is from a municipal or industrial water supply system, the required flow rate should be available at a minimum pressure of 140 kPa.

(c) The water supply as required in Item 3(a) should not be less than that needed to provide the minimum flow rate specified in Table 2 for a minimum duration of 30 minutes.

(d) Where a masonry wall with a minimum fire-resistance rating of 2 h, and no unprotected openings is provided as an exterior wall, the spatial coefficient (S_{side}) for this side of the building may be considered equal to 0. This masonry wall should be provided with a minimum 150 mm parapet. Firewalls that divide a structure into two or more buildings may be given similar consideration when evaluating the exposure of the buildings to each other.

(e) In elementary or secondary schools, the water supply determined in accordance with Items 3(a) and 3(b) may be reduced. The level of reduction to be applied would be at the discretion of the local jurisdictional authority, and should not exceed 30 per cent.

(f) The spatial coefficient S_{side} may be considered equal to 0 when the exposed building is on the same property and is less than 10 m^2 in building area.

4. Additions to Existing Buildings

(a) Except as permitted in Items 4(b) and 4(c), additions to existing buildings should be provided with a water supply for fire fighting as required in Items 3(a) to 3(e). Although under Part 11, Renovation, the required water supply is to be based only on the building volume of the addition, it is recommended that the entire building volume of the expanded facility be used to ensure complete evacuation and safety of all the occupants.

(b) Buildings with new additions falling within any one of the following criteria would not require an additional water supply for fire fighting where:

- (i) the expanded building complies with all the requirements of Item 1(a),
- (ii) the new addition does not exceed 100 m^2 in building area, or
- (iii) the new addition exceeds 100 m^2 but does not exceed 400 m^2 in building area, contains an assembly, business and personal services, mercantile or low hazard industrial occupancy, is of noncombustible construction, does not result in a significant increase in exposure to other existing buildings, has no combustible storage or process, and is separated from the existing building by a fire separation with a fire-resistance rating of at least 1 h.

(c) Where a firewall is provided between the new addition and the existing building, the water supply for fire fighting may be determined in accordance with Items 1(a) and 3(a), using only the building volume of the new addition.

Table 1

WATER SUPPLY COEFFICIENT - K

TYPE OF CONSTRUCTION	Classification by Group or Division in Accordance with Table 3.1.2.1. of the Building Code				
	A-2 B-1 B-2 B-3 C D	A-4 F-3	A-1 A-3	E F-2	F-1
Building is of noncombustible construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2., including loadbearing walls, columns and arches.	10	12	14	17	23
Building is of noncombustible construction or of heavy timber construction conforming to Article 3.1.4.6. Floor assemblies are fire separations but with no fire-resistance rating. Roof assemblies, mezzanines, loadbearing walls, columns and arches do not have a fire-resistance rating.	16	19	22	27	37
Building is of combustible construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2., including loadbearing walls, columns and arches. Noncombustible construction may be used in lieu of fire-resistance rating where permitted in Subsection 3.2.2.	18	22	25	31	41
Building is of combustible construction. Floor assemblies are fire separations but with no fire-resistance rating. Roof assemblies, mezzanines, loadbearing walls, columns and arches do not have a fire-resistance rating.	23	28	32	39	53
Column 1	2	3	4	5	6

Table 2

OBC Part 3 Buildings	Required Minimum Water Supply Flow Rate (L/min)
One-storey building with building area not exceeding 600 m²	1800
All other buildings	2700 (if Q ≤ 108,000 L)[1] 3600 (if Q > 108,000 L and ≤ 135,000 L)[1] 4500 (if Q > 135,000 L and ≤ 162,000 L)[1] 5400 (if Q > 162,000 L and ≤ 190,000 L)[1] 6300 (if Q > 190,000 L and ≤ 270,000 L)[1] 9000 (if Q > 270,000 L)[1]

Note to Table 2:

(1) $Q = KVS_{tot}$ as referenced in Paragraph 3(a)

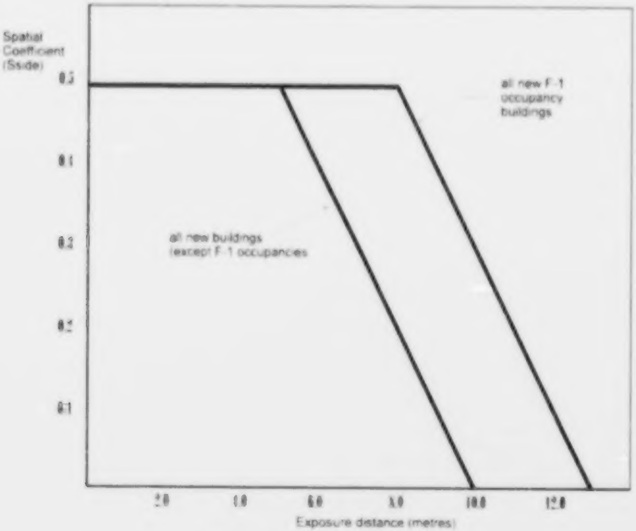


Figure 1
Spatial Coefficient vs Exposure Distance

Further clarification of intent and sample problems and solutions are contained in the "Fire Protection Water Supply Guideline for Part 3 in the Ontario Building Code". Copies of this guideline may be obtained by contacting the Research and Standards Section of the Office of the Fire Marshal, Ministry of the Solicitor General and Correctional Services at the following address:

Place Nouveau Building, 7th Floor
5775 Yonge Street
North York, Ontario
M2M 4J1
Tel. (416) 325-3201
Fax. (416) 325-3213

A-3.2.5.13.(1) Sprinkler System Design.

In NFPA 13, "Standard for the Installation of Sprinkler Systems", reference is made to other NFPA standards which contain additional sprinkler design criteria. These criteria apply to industrial occupancies with high fire loads, including warehouses with high piled storage, and industrial occupancies intended for the use, manufacture or storage of highly flammable materials. Therefore, while only NFPA 13 is called up directly by Sentence 3.2.5.13.(1), the additional criteria in the other NFPA standards are included automatically.

In some NFPA standards, certain aspects of sprinkler protection are dependent on the fire-resistance rating of the vertical structural members. In these cases, the sprinkler system design options can be affected by the fire-resistance rating of these elements. For example, in buildings used for the storage of rubber tires, sprinklers directed at the sides of a column are required if the column does not have the required fire-resistance rating.

Other NFPA standards may require that certain occupancies be sprinklered in conformance with NFPA 13, as in the case of some garages. These requirements do not supersede the requirements in the Code. An occupancy is required to be sprinklered only when this is specified in the Code, but when it is so required, it must be sprinklered in conformance with NFPA 13 and its referenced standards.

A-3.2.5.13.(6) Sprinklering of Roof Assembly.

Sprinkler protection for roof assemblies in lieu of fire resistance is based on the assumption that the sprinklers will protect the roof assembly from the effects of fire in spaces below the roof. If a ceiling membrane is provided, the sprinklers would have to be located below the membrane in order to react quickly to the fire. In certain instances, however, sprinklers may be required within the concealed spaces as well as below the membrane. NFPA 13, "Standard for the Installation of Sprinkler Systems", requires sprinklers in certain concealed spaces.

According to NFPA 13 and 13R, rooms and closets in the storey immediately below the roof assembly do not require sprinklers. However, the Building Code requires sprinkler protection within all rooms and closets immediately below the roof so as to control any fire that might start in that space and thereby limit the probability of the fire spreading into the roof assembly. Moreover, NFPA 13D, "Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes," also allows the omission of sprinklers in such rooms and closets under certain circumstances, provided the building is sprinklered in conformance with this standard. In this case, the Building Code concurs with the provisions of the NFPA 13D standard.

A-3.2.5.13.(7) Fast Response Sprinklers.

Several types of sprinkler will respond to a fire faster than a conventional standard response sprinkler. The Response Time Index (RTI) is used to quantify the sensitivity of the sprinkler link for any given sprinkler. The RTI for the group of fast response sprinklers described below will on average range from $22\ s^{0.5}\cdot m^{0.5}$ to $33\ s^{0.5}\cdot m^{0.5}$. RTI values for standard response sprinklers will typically be in the range of $83\ s^{0.5}\cdot m^{0.5}$ to $110\ s^{0.5}\cdot m^{0.5}$.

Any confusion as to the appropriate type of fast response sprinkler for different types of building should be alleviated by considering the testing criteria described below and the reference to the appropriate NFPA installation standards.

Although the Code specifies where fast response sprinklers are required it does not prevent the appropriate use of fast response sprinklers in other occupancies.

Residential sprinklers are tested in accordance with UL 1626, "Standard for Residential Sprinklers for Fire Protection Service". They are installed in accordance with NFPA 13R, "Standard for the Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height", with NFPA 13D, "Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Mobile Homes", and with Section 4-3.6 of NFPA 13, "Standard for the Installation of Sprinkler Systems", for residential occupancies and for dwelling units.

Quick-response sprinklers are tested in accordance with ANSI/UL 199, "Standard for Automatic Sprinklers for Fire Protection Service". They are installed in accordance with NFPA 13, "Standard for the Installation of Sprinkler Systems", for spacing, density and location. They are acceptable for limited use as described in NFPA 13R, "Standard for the

Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height", but are not permitted for use under NFPA 13D, "Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Mobile Homes".

Early suppression fast response sprinklers are tested in accordance with FM 2008, "Early Suppression Fast Response Automatic Sprinklers". They are installed in accordance with NFPA 13, "Standard for the Installation of Sprinkler Systems", but are not accepted for use under either NFPA 13R, "Standard for the Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height", or NFPA 13D, "Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Mobile Homes".

Quick response extended coverage sprinklers are tested in accordance with ANSI/UL 199, "Standard for Automatic Sprinklers for Fire Protection Service". They are installed in accordance with NFPA 13, "Standard for the Installation of Sprinkler Systems", for spacing, density and location. They are acceptable for limited use as permitted by NFPA 13R, "Standard for the Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height", but are not permitted for use under NFPA 13D, "Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Mobile Homes".

A-3.2.5.13.(8) Sprinkler Rating.

The requirements of this Sentence can be met by using sprinklers with a rating of 79°C to 107°C.

A-3.2.5.14.(1) Hazard Classification for Sprinkler Selection.

The reference to light hazard occupancies is based on the descriptions of these occupancies given in NFPA 13, "Standard for the Installation of Sprinkler Systems" and is intended only for use in the design of sprinkler systems. These descriptions should not be confused with the occupancy classifications in the Code.

In NFPA 13 a light hazard occupancy is one in which the quantity or combustibility of contents is low and fires with relatively low rates of heat release are expected. Typical buildings or parts of buildings include: churches; clubs; eaves and overhangs, if of combustible construction with no combustibles beneath; educational buildings; hospitals; institutional buildings; libraries, except very large stack rooms; museums; nursing or convalescent homes; offices, including data processing rooms; residential buildings; restaurant seating areas; theatres and auditoria, excluding stages and proscenia; and unused attics.

Although NFPA 13R, "Standard for the Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height", and NFPA 13D, "Standard for the Installation of Sprinkler-Systems in One- and Two-Family Dwellings and Mobile Homes", as referenced by NFPA 13, are concerned with specific types of residential occupancy, namely apartment buildings up to four storeys, one and two family dwellings, and mobile homes, for the purpose of acceptance of combustible sprinkler piping these occupancies are considered to be included in the category of residential buildings under light hazard occupancies.

A-3.2.5.19.(1) Fire Pumps.

In order to ensure an adequate water supply, it may be necessary to install a fire pump for a building that has either a standpipe system or an automatic sprinkler system installed. Reference to NFPA 20, "Standard for the Installation of Centrifugal Fire Pumps", provides the necessary guidance to designers.

A-3.2.6. High Buildings.

Experience with high buildings has shown that the time required for complete evacuation can exceed that which is considered necessary for the safe egress of all occupants. Studies of the "chimney effect" and observations of smoke movement in actual fires have shown that present measures for containing a fire on any 1 storey will not usually prevent the movement of smoke through elevator, stair and other vertical shafts to the upper floors of a high building. Occupants of a high building, and particularly those on upper storeys, may therefore be faced with severe smoke conditions from fires occurring in storeys below them before their own evacuation is possible. The requirements of Subsection 3.2.6. are intended to maintain safe conditions for occupants of a high building who may have to remain in the building during a fire, and to assist the fire fighters by providing efficient access to the fire floor.

It is assumed that buildings regulated by Subsection 3.2.6. will be in an area served by a fire department capable of an early response and that all fire fighting and rescue situations will be under the direct control of the officer-in-charge of the fire department responding to the emergency.

Measures that relate to limiting or controlling the movement of smoke caused by a building fire are described in the Supplementary Standard SB-4. Adoption of one of these measures is considered to be an acceptable means of complying with the requirements of this Subsection.

A-3.2.6.8.(6)(a) Elevator Recall.

Automatic emergency recall actuation that is dependent on the operation of 2 smoke detectors in the elevator lobby meets the intent of this requirement. Such an arrangement may reduce the frequency of nuisance recalls.

A-3.2.7.4.(1) Emergency Power Reliability.

In some areas power outages are frequent and may be of long duration. These local conditions should be taken into account in determining the type of system for supplying emergency power for lighting. This should be studied at the planning stage of a building project in conjunction with the local fire safety and building officials.

A-3.2.7.6.(1) Emergency Power for Hospitals.

CAN/CSA-232, "Electrical Safety and Essential Electrical Systems in Health Care Facilities," contains requirements other than those that relate specifically to the installation of emergency equipment. Compliance with these other requirements is not intended by the reference in Article 3.2.7.6. The standard refers to three classes of health care facilities - Class A, Class B and Class C - and states that the standard applies to Class A and Class C health care facilities but not to Class B health care facilities. Since the CAN/CSA-Z32 standard does not apply to facilities in which residents, as a result of physical or mental disabilities, are unable to function independently and require daily care by health care professionals, the standard applicable to these facilities is CAN/CSA-C282, "Emergency Electrical Power Supply for Buildings."

A-3.2.7.8.(3) Emergency Power Duration.

The times indicated in this Sentence are the durations for which emergency power must be available for a building under fire emergency conditions. Additional fuel for generators or additional battery capacity is required to handle normal testing of the equipment. If the operation of emergency generators or batteries is intended for other than fire emergency conditions, such as power failures, fuel supplies or battery capacity must be increased to compensate for that use.

A-3.2.7.9.(1) Emergency Power Reliability.

In some areas power outages are frequent and may be of long duration. These local conditions should be taken into account in determining the type of system for supplying emergency power for building services. This should be studied at the planning stage of a building project in conjunction with the local fire safety and building officials.

A-3.2.8.2.(3) Special Protection of Opening.

In manufacturing operations involving the use of conveyor systems to transport material through fire separations, it may not be possible to use standard closure devices. NFPA 80, "Standard for Fire Doors and Fire Windows", includes appendix information concerning protection of openings through vertical fire separations. NFPA 13, "Standard for the Installation of Sprinkler Systems", includes methods of protecting openings through floor assemblies, however, it is assumed by that standard that the remainder of the building would be sprinklered. Combinations of methods may be required to ensure that the level of safety inherent in the requirements of the Code is maintained.

A-3.2.8.2.(6) Waiver of Occupancy Separation Continuity.

The typical application of this Sentence is to buildings with a mixture of occupancies that are randomly located throughout the building. Examples include shopping centres, podia of large commercial and business complexes, and recreational buildings that are combined with mercantile and business operations. A shopping mall with two interconnected storeys is an example that is frequently encountered in many jurisdictions. The permission to breach the floor assembly between the storeys does not override requirements for separation of specific suites or occupancies. For instance, although storage garages are Group F, Division 3 occupancies, the requirement in Article 3.3.5.6. for the storage garage to be separated from other occupancies by a fire separation with at least a 1.5 h fire-resistance rating must be observed. In a similar manner, a theatre or cinema (Group A, Division 1 occupancy) must be separated from other occupancies in accordance with Sentence 3.3.2.2.(1) and seats in an arena type building (Group A, Division 3) must be separated from space below in accordance with Sentence 3.3.2.2.(3).

A-3.2.8.3.(2)(b) Area of Ellipse.

The area of an ellipse, whose semiaxes are a and b, is equal to "$\pi \cdot ab$", where $\pi = 3.14$.

A-3.2.8.4.(6) Area of Safety.

The objective of this Sentence is to provide an area of temporary safety in the exit stair shafts for those occupants of the interconnected floor space. This requirement is considered to be met where 0.3 m^2 per person is provided in the stair shaft between the floor level served and floor level immediately beneath it.

A-3.2.8.8.(1)(b) Smoke Detector Location.

In the design and installation of the smoke detection system, it is essential that consideration be given to all features which could have a bearing on the location and sensitivity of the detectors, including such pertinent physical configurations as ceiling height, sloped ceilings, diffusion from air conditioning and ventilating currents and the location of any obstructions or baffles that might interfere with the proper operation of the system.

A-3.2.9.2.(4)(c) Fire Department Pumping Equipment.

Availability of appropriate pumping equipment from the local fire department or, in the case of industrial plants or complexes, from their fire brigade, is considered sufficient to meet the intent of this requirement.

A-3.3. Safety Within Floor Area.

Section 3.3. regulates safety within floor areas including rooms or other spaces within a building, with the exception of service rooms and service spaces that are regulated by Section 3.6. The requirements are grouped according to the occupancy of the floor area, room or space. The occupancy of these floor areas and other spaces is not necessarily the major occupancy for which the building is classified.

Life safety for the occupants of any floor area depends in the first instance on the use or occupancy of that floor area. The risks to the occupants occur in the early stages of a fire. These special life risks differ from one occupancy to another and, consequently, must be regulated differently. Section 3.3. regulates risks within floor areas, and these requirements apply regardless of the major occupancy of the building that contains them. For example, an assembly room must comply with the requirements for assembly occupancy whether it is contained in an office building, hospital, hotel, theatre, industrial building or other major occupancy.

A-3.3.1.2.(1) Hazardous Substance.

Dangerous goods, as defined in the Fire Code and regulated by the federal "Transportation of Dangerous Goods Act" and its Regulations, constitute one type of hazardous substance in the sense of the NBC. They include gases and radioactive, corrosive, poisonous, oxidizing, reactive, explosive and flammable substances. The term "hazardous substance" in the Building Code also means materials and products that are not regulated by the Transportation of Dangerous Goods Regulations but that pose a fire or explosion hazard due to their own properties or because of the manner in which they are stored, handled or used. These include combustible products, rubber tires, combustible fibres, combustible dusts, products producing flammable vapours or gases.

A-3.3.1.2.(2) Cooking Equipment Ventilation.

Cooking equipment manufactured for use in dwelling units and other residential suites is often installed in buildings used for assembly and care or detention purposes. It is not obvious from the Code requirements or those of NFPA 96, "Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations", whether a ventilation and grease removal system is required in all assembly and care or detention uses. If the equipment is to be used in a manner that will produce grease-laden vapours that are substantially more than would be produced in a normal household environment, then it would be appropriate to apply the requirements of NFPA 96. If the equipment is used primarily for reheating food prepared elsewhere or is used occasionally for demonstration or educational purposes, there would be no expectation of applying the requirements of NFPA 96. In all cases the circumstances should be reviewed with the municipal officials.

A-3.3.1.4.(1) Occupancy in Corridor.

Since this Code regulates new construction, alterations and changes of occupancy, kiosks in public corridors are required to be constructed on the same basis as the remainder of the building. This means that the construction of kiosks and similar structures must take into consideration all the requirements which apply to the remainder of the building, including structural fire protection, construction type, finish materials, egress widths and sprinkler installations.

A-3.3.1.7.(1) Temporary Refuge for Persons with Disabilities.

These measures are intended to provide temporary refuge for persons with disabilities. It is acknowledged, however, that the measures cannot provide absolute safety for all occupants in the fire area. It may, therefore, be necessary to develop special arrangements in the fire safety plan to evacuate persons with disabilities from these areas.

The protected elevator referred to in Clause 3.3.1.7.(1)(a) is intended to be used by fire fighters as a means for evacuating persons with disabilities. It is not intended that this elevator be used by persons with disabilities as a means of egress without the assistance of fire fighters.

If an estimate is to be made of the number of persons with disabilities in a floor area who can be accommodated in each zone in Clause 3.3.1.7.(1)(b), this estimate may be based on Table 3.8.2.1., which is used to determine the minimum number of spaces to be provided for wheelchair occupants in fixed seating areas. If more precise information is available, it should be used for sizing the zones.

A-3.3.1.9.(4) Obstruction in Corridor.

The sweep of a cane used by blind or visually impaired persons normally detects obstructions that are within 680 mm of the floor. Any obstruction above this height would not normally be detected and can, therefore, create a hazard if it projects more than 100 mm into the path of travel.

A-3.3.1.11.(3) Movable Partitions.

Should an emergency situation arise outside of normal working hours but when occupants are still in the space, they could be left without a clear way out. This could occur during inventory or after closing time when all occupants have not yet left, but staff close the door to prevent other persons from entering. In many small tenant areas, the movable partitions (store fronts) provide the only way out. There should always be a second way out or a swinging door within or adjacent to the sliding partitions.

A-3.3.1.12.(4) Door Hardware.

The permission to have additional door releasing devices is intended to allow the use of a security chain, night latch or dead bolt to supplement the normal door latching device. These are permitted for dwelling units and locations where guests in a hotel require additional security. The height of these items is also governed by the maximum height stipulated in Sentence 3.3.1.12.(5) to ensure that they can be operated by persons with physical disabilities. This additional hardware should not require appreciable dexterity by the user and the general requirements on the ability to operate the device without the use of keys, special tools or specialized knowledge still apply.

A-3.3.1.12.(6) Controlled Egress Doors.

It is intended that Sentence 3.3.1.12.(6) apply to doors used at the perimeter of a contained use area or an impeded egress zone. If the contained use area consists of a single room, the requirements would apply to that room. In the case of individual cells within a contained use area, exterior keyed locks could be used on the cell doors consistent with the fire safety plan and continuous supervision by staff who can release the doors in an emergency.

A-3.3.1.22. Obstructions in Means of Egress.

Obstructions including posts, counters or turnstiles should not be located in a manner that would restrict the width of a normal means of egress from a floor area or part of a floor area unless an alternative means of egress is provided adjacent to and plainly visible from the restricted means of egress.

A-3.3.2.3.(2) Tablet Arms.

Although it is intended that the motion to raise the tablet arm be essentially a single fluid motion, it is acceptable that the motion be a compound motion of raising the tablet arm and including an articulation to allow the tablet to fall back alongside the arm rest.

A-3.3.3.1. Safety in a Care or Detention Occupancy.

Fire safety for patients and residents in sleeping room areas in care or detention occupancies is predicated on the ability of staff to carry out at all times essential life safety functions in accordance with the fire safety plan.

A-3.3.3.4. Doorway Width.

The 1 050 mm minimum clear width of doorways accounts for door stops and, thus, is intended to allow for the use of 1 100 mm doors.

A-3.3.3.5.(1) Hospitals and Nursing Homes.

The basis for the requirements in this Article is that staff will be in attendance at all times on the same storey, either in each fire compartment or in a fire compartment immediately adjacent.

A nursing home is intended to include skilled nursing facilities, intermediate care facilities and some homes for the aged. Occupants of nursing homes are assumed to be, for the most part, non-ambulatory. The use of physical restraints and tranquilizing drugs which may render occupants immobile are also factors which should be considered.

Although the age of patients by itself is not sufficient justification for a floor area to be included in a nursing home occupancy, it should be recognized that many homes for the aged are in fact nursing homes. The factor that determines whether or not a home for the aged is a nursing home and, therefore, a care and treatment occupancy, is whether or not continuous nursing care is required for the occupants. Where continuous nursing care and treatment is not provided for the occupants, a home for the aged may be classified as either a care occupancy or a residential occupancy. If no care is provided to the residents, a home for the aged would normally be classified as a residential occupancy.

A-3.3.3.5.(6) Weatherstripping.

"Weatherstripped or otherwise" is intended to provide for adequate draft resistant sealing material to retard the passage of smoke through closure assemblies used in fire separations.

A-3.3.3.5.(10) Intercommunicating Rooms.

Rooms that are interconnected can include more than one sleeping room, together with ensuite toilet rooms, shower rooms, and storage closets used for the storage of personal items of the persons occupying the sleeping rooms. It is not intended that storage rooms for other purposes be included within the group of interconnected rooms.

A-3.3.4.4.(1) Landing in Egress Stairway.

A landing level used in an egress stairway from a dwelling unit is not considered to be a storey of that dwelling unit if the landing is used only for pedestrian travel purposes.

A-3.3.4.5. Automatic Locking Prohibited.

Doors that must be manually reset to lock them when they are opened from the inside meet the intent of this requirement.

A-3.4.1.6.(2) Sleeping Area.

Areas serving patients' or residents' sleeping rooms include sleeping areas and areas where patients or residents are taken for treatment.

A-3.4.2.3.(1) Least Distance Between Exits.

The least distance measurement does not apply to each combination of exits on a multi-exit storey. It only applies to at least 2 of the required exits from that storey.

A-3.4.3.2.(7) Door Width.

The clear width values of exit doorways in Clauses 3.4.3.2.(7)(f) and (g) account for door stops and are intended to allow for the use of 1 100 mm (3 ft 7 in) doors in Clause 3.4.3.2.(7)(f) and 810 mm (2 ft 8 in) doors in Clause 3.4.3.2.(7)(g).

A-3.4.4.2.(2)(e) Requirements for Lobby.

If an exit is permitted to lead through a lobby, the lobby must provide a level of protection approaching that of the exit. As well as meeting the width and height requirements for exits, the lobby must be separated from the remainder of the building by a fire separation having a fire-resistance rating at least equal to that required for the exit, unless one of the exceptions in this Clause is applied.

A-3.4.5.2.(2) Stairwell Signs.

Past experience indicates that some persons attempt to exit at the roof level of a building in the event of an emergency. Rescue from the roof of a building more than six storeys high is rarely possible from the exterior of a building. In order to avoid instances of persons getting trapped by smoke at the top of a stairwell that has no access to a roof, signs are required within the stairwell (at least one sign immediately above the highest normally occupied floor level) to indicate that the stairwell does not provide an exit at the roof level. The sign should consist of a graphic and text to indicate that there is no exit to the roof.

A-3.4.6. Application to Means of Egress.

The requirements in Subsection 3.4.6. apply to interior and exterior exits, as well as to ramps, stairways and passageways used by the public as access to exit. The treads, risers, landings, handrails and guards for the latter access to exit facilities must thus be provided in conformance with the appropriate requirements for exit facilities.

A-3.4.6.4.(5) Continuity of Handrail.

Blind or visually-impaired persons rely on handrails to guide them on stairways. A continuous handrail will assist them in negotiating stairs at changes in direction. The extended handrail is useful to persons with physical disabilities to steady themselves before using the stairs. Handrails should, however, return to the wall, floor or post, so as not to constitute a hazard to blind or visually-impaired persons.

A-3.4.6.7.(3) Stair Tolerances.

The term "uniform run and rise" assumes normal construction tolerances.

A-3.4.6.9.(5) Door Swing.

Although it is required that the door on the right hand side of a pair of doors shall swing in the direction of travel through the exit, the direction of swing of the door on the left side will depend on the function of the horizontal exit. If the horizontal exit provides for movement from one building to the adjacent building but does not require movement in the reverse direction, both doors must swing in the direction of travel to the adjacent building. If the design is based upon both buildings providing complementary movement in either direction, then the doors must swing in opposite directions. Location of a required exit sign directly above a door that swings in the direction of travel is deemed to meet the intent of Clause 3.4.6.9.(5)(b).

A-3.4.6.10.(3) Exit Concealment.

Hangings or draperies placed over exit doors may conceal or obscure them.

A-3.4.6.15.(1) Fastening Device.

Turnpieces of a type which must be rotated through an angle of more than 90° before releasing a locking bolt are not considered to be readily openable. The release of a locking bolt should allow the door to open without having to operate other devices on the door.

A-3.4.6.15.(4) Electromagnetic Lock.

Electromagnetic locks are intended for use where there is a need for security additional to that provided by traditional exit hardware. They are not intended for indiscriminate use as alternative locking devices.

The design of these devices requires evaluation to ensure that their operation will be fail-safe in allowing exiting in the event of foreseeable emergencies.

If more than one locking device is used in a building, it is expected that one switch will release and reset all devices simultaneously. If more than one such switch is provided in a building, at least one switch must be installed in the annunciator panel located at the main entrance of the building or, in the case of a building within the scope of Subsection 3.2.6., in the central alarm and control facility for easy access of fire department personnel.

Most importantly, electromagnetic locks are not to be used where panic hardware must be installed. This will ensure that a large number of occupants can exit a building quickly in emergency situations created by either fire or non-fire conditions. It will also ensure that occupants in buildings containing highly hazardous substances can exit quickly unimpeded in an emergency.

In care and treatment facilities, such as hospitals and nursing homes, and residential care facilities, however, because the occupant load is relatively low and the level of staff supervision is generally high, electromagnetic devices may be installed on exit doors at the bottom of exit stairways where panic hardware is required by code to maintain security where necessary.

When installed on doors in fire separations, electromagnetic locking devices must used in conjunction with positive latching devices designed to hold the doors in the closed position since these locks do not incorporate latches and are released in an emergency. In a fire, keeping doors in fire separations closed is essential to control the spread of fire and smoke.

To enable exiting without delay (especially important in non-fire emergency situation), a manual pull station must be installed in close proximity to the door equipped with an electromagnetic locking device. The operation of this manual pull station will immediately release the electromagnetic locking device and, at the same time, activate the building fire alarm system.

Precautionary measures should be in place to ensure that by-pass switches would be deactivated at the completion of each fire alarm testing. An audible and a visual signal at the annunciator panel and at the monitory station should provide such assurance.

A-3.4.6.18.(1)(d) Colour Contrast.

The identification of floor and other signs intended to facilitate orientation for visually-impaired persons should offer maximum colour contrast to be effective. For this reason, it is recommended that white on black or black on white be used, as this combination produces the best legibility. It is also recommended that the sign surfaces be processed to prevent glare.

A-3.5.4.1.(1) Elevator Car Dimensions.

In some circumstances, it is necessary to maintain a patient on a stretcher in the prone position during transit to a hospital or to treatment facilities. Inclining the stretcher to load it into an elevator could be fatal or at the very least detrimental to the patient's health. Many ambulance services use a 2 010 mm long by 610 mm wide mobile patient stretcher. As well as space for the stretcher in the elevator, there should be sufficient additional space for at least two attendants who may also be providing treatment during transit. Common elevator units that can satisfy this requirement include:

- a 1 134 kg elevator car with minimum interior dimensions of 2 032 mm wide and 1 295 mm deep with a right or left hand access door. The minimum access door width is 1 067 mm and it must be on the 2 032 mm side of the car.
- a 1 134 kg elevator car with minimum interior dimensions of 2 032 mm deep and 1 295 mm wide with a minimum 915 mm wide access door located on the 1 295 mm side.

A-3.6.2.1.(1) Location of Fuel-Fired Appliances.

Sentence 3.6.2.1.(1) requires that fuel-fired appliances be located in service rooms. It does not allow for their installation in service spaces.

A-3.6.2.5.(1) Combustible Refuse Storage.

Storage of refuse consisting of combustible materials including waste paper, cardboard and plastic, and noncombustible materials such as glass and metallic containers can be accumulated in these rooms for the purpose of recycling. This storage is allowed in consideration of a less stringent collection schedule when compared to that of garbage or refuse, which is collected regularly.

A-3.6.3.1.(1) Vertical Service Spaces.

Sentence 3.6.3.1.(1) does not prohibit the internal subdivision of a vertical service space to allow different building services to be installed in physically separated spaces unless other requirements apply (see, for example, Article 3.2.7.10.). Fire separation requirements apply to the perimeter of the group of service spaces. Article 3.6.3.3. has special requirements for linen chutes and refuse chutes.

A-3.6.4.2.(2) Ceiling Membrane Rating.

In construction assemblies that utilize membrane ceiling protection and have been assigned a fire-resistance rating on the basis of a fire test, the membrane is only one of the elements that contribute to the performance of the assembly and does not in itself provide the protection implied by the rating. For the fire-resistance rating of membrane materials used in this form of construction, reference should be made to the results of fire tests which have been conducted to specifically evaluate the performance of this element.

A-3.7.2.1.(1) Window Area Limit.

Part 9 requirements for windows cover a number of subjects, however, this Article refers only to the area limits.

A-3.7.4.2.(1) Sanitary Facilities.

It is assumed that if the sanitary facilities are provided on every storey, the occupant load for the determination of the number of fixtures would be the anticipated occupant load of that storey. If the washrooms are provided in a central location, the number of fixtures should then be based on the total anticipated occupant load for the entire building.

A-3.7.5.3.(1) Shielding of X-Ray Equipment.

Every installation of an x-ray machine or x-ray equipment used for the exposure of persons shall be shielded with a primary and a secondary protective barrier to protect any person who could be exposed to radiation. This protection is required for

- x-ray workers
- persons other than patients undergoing an application of therapeutic or diagnostic x-rays
- persons in adjacent buildings
- persons located outdoors of buildings containing x-ray equipment.

These protective barriers should be designed and installed to comply with requirements of The Healing Arts Radiation Protection Act. Applications for approval for these installations should be addressed to the Ministry of Health.

Similarly, every installation of an x-ray machine or x-ray equipment for industrial or veterinary applications shall be shielded with a primary and a secondary protective barrier to protect any person who could be exposed to radiation. This protection is required for

- x-ray workers,
- persons other than x-ray workers,
- persons in adjacent buildings, and
- persons located outdoors of buildings containing x-ray equipment.

The protective barriers should be designed and installed to comply with requirements of The Occupational Health and Safety Act. Applications for approval for these installations should be addressed to the Ministry of Health.

A-3.8. Barrier-Free Design Assumptions.

This Section contains minimum provisions to accommodate a person using a typical manual wheelchair or other manual mobility assistance devices such as walking aids, including canes, crutches, braces and artificial limbs.

A-3.8.1.1. Accessibility.

Industrial buildings often pose a greater risk to their occupants due to the presence of significant quantities of dangerous materials or the use of hazardous processes. For example, plants which are classified as Group F, Division 2 or 3, may store and use toxic or highly flammable substances in significant quantities, or house processes which involve very high temperatures and which may have a high degree of automation. In some facilities, particularly in primary industries such as forestry and metallurgy, the construction normally used and the operations carried out within the space can make compliance with the requirements of Section 3.8. impractical. It is therefore intended that these requirements be applied with discretion in buildings of Group F, Division 2 or 3 major occupancy. However, where industrial buildings contain subsidiary occupancies, such as offices or showrooms, it is reasonable to require that accessibility be provided in these spaces.

A-3.8.1.2. Entrances.

An accessible route should exist from the sidewalk or roadway and parking area to an accessible building entrance. This route should be located so that persons with physical disabilities do not have to pass behind parked cars. To provide more general access to buildings, not less than the number of pedestrian entrances as required by Table 3.8.1.2. are required to be barrier-free. This should include a principal entrance. For the purpose of determining the number of entrances to a building, several adjacent doors in a bank of doors are considered to be a single entrance.

A-3.8.1.4.(1) Access to Storeys Served by Escalators and Moving Walks.

In some buildings, escalators and inclined moving walks are installed to provide transportation from one floor level to another floor level so as to increase the capacity to move large numbers of persons. Some buildings located on a sloping site are accessible from street level on more than one storey and an escalator or inclined moving walk is provided for internal movement from floor to floor. In both these situations, a person with a physical disability must be provided with an equally convenient means of moving between the same floor levels within the building. A wheelchair user should not be required to travel outside the building in order to gain access to another level. This can be accomplished by providing elevators or a platform-equipped passenger-elevating device.

A-3.8.2.1.(2) Access to Rooms and Facilities.

If barrier-free access is required into suites or rooms in Subsection 3.8.2., it is intended that access be provided, with some exceptions identified in Sentence 3.8.2.1.(2), throughout each room or suite. Some examples of where barrier-free access is required are as follows:

- within each suite (subject to Clauses 3.8.2.1.(2)(j) to (l)),
- within rooms or areas that serve the public or are designated for use by visitors, including areas in assembly occupancies with fixed seats, display areas and merchandising departments,
- within rooms or areas for student use in assembly occupancies,
- within general work areas, including office areas,
- within general use or general service areas, including shared laundry areas in residential occupancies, recreational areas, cafeterias, lounge rooms, lunch rooms and infirmaries,

- within sleeping rooms in hospitals and nursing homes,
- (if installed), into at least one passenger elevator or elevating device conforming to Article 3.8.3.5.,
- into washrooms described in Article 3.8.2.3.,
- to any facility required by this Section to be designed to accommodate persons with physical disabilities,
- onto every balcony provided in conformance with Sentence 3.3.1.7.(2),
- to service counters used by the general public (examples include ticket counters, refreshment stands, drinking fountains, cafeteria counters, checkout counters and bank service counters)
- into 10% of hotel suites, (not more than 20 suites required), and
- within 10% of residential suites in an apartment building from the suite entrance door to at least one bedroom and bathroom at the same level

The permission to waive a barrier-free path of travel for wheelchair access to certain specified areas of a building is not intended to waive accessibility requirements for persons whose physical disabilities do not require special provision for access to raised or sunken levels. Persons with visual or hearing disabilities that do not require the use of a wheelchair can be expected to move throughout a building.

The concept of providing similar amenities and facilities applies, among other things, to food, beverage, and entertainment facilities within restaurants, and to window areas providing a view of an exterior attraction. Availability of specific spaces depends on reservation policy and the sequence in which patrons arrive at a restaurant or other facility, and therefore is beyond the scope of this Code.

Accessibility "within" a floor area means that in general all normally occupied spaces are to be accessible, except those areas which are deemed not to require barrier-free access. Examples of excluded floor areas are small raised office areas in retail and industrial premises and storage platforms in industrial and other occupancies.

The concept of wheelchair accessibility does not extend to building service facilities, nor to all floor levels within a storey, e.g., mezzanines not served by an elevator. Mezzanines that are accessible by an elevator are therefore not excluded.

A-3.8.2.1.(3) Fixed Seating.

Spaces for persons using wheelchairs should be scattered rather than located in one place so as to provide a choice of location for the users. Locating such spaces in pairs enables a wheelchair user to accompany another wheelchair user or an ambulant companion.

A-3.8.2.2.(1) Parking Areas.

In localities where municipal by-laws do not govern the provision of or dimensions of barrier-free parking spaces, the following provides guidance to determine appropriate provisions. If more than 50 parking spaces are provided, parking spaces for use by persons with physical disabilities should be provided in the ratio of one for every 100 parking spaces or part thereof. Parking spaces for use by persons with physical disabilities should

(1) be not less than 2 400 mm wide and provided on one side with an access aisle not less than 1 500 mm wide,
(2) have a firm, slip-resistant and level surface,
(3) be located close to an entrance required to conform to Article 3.8.1.2.,
(4) be clearly marked as being for the use of persons with physical disabilities, and
(5) be identified by a sign located not less than 1 500 mm above ground level, with the international symbol of accessibility and the words "Permit Required" (Figure A-3.8.2.2.A.).

Asphalt, concrete and gravel are acceptable parking surfaces. Curb ramps should be not less than 920 mm wide. Parallel parking spaces should be not less than 7 000 mm long. If more than one parking space is provided for persons with physical disabilities, a single access aisle can serve two adjacent parking spaces. The arrangement shown in Figure A-3.8.2.2.B. allows the shared use of an access aisle to serve two adjacent parking spaces provided for use by persons with physical disabilities.

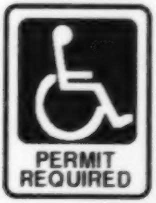


Figure A-3.8.2.2.A.
Permit Required Sign

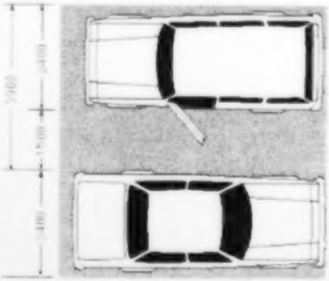


Figure A-3.8.2.2.B.
Shared access aisle

A-3.8.2.2.(1)(a) Access to Exterior Parking.

It is not intended that a separate accessible entrance must be provided from the exterior parking area. The designer may choose to designate the entrance leading to the exterior parking area as the required entrance or provide a properly identified and unobstructed path of travel from the parking area to the entrance which is accessible. The entrance chosen should, in any case, be one normally used by the occupants of the building. Long paths of travel are not recommended.

A-3.8.2.3. Washrooms.

The primary intent of this requirement is that all regular washrooms be made accessible to all persons, including persons with disabilities, primarily persons who must use a wheelchair. Well-designed washrooms which can accommodate disabled persons need not be much larger than conventional washrooms.

The exception in Clause (3)(b) recognizes situations where several washrooms may be provided on a large floor area. In such a case, not all washrooms need to be barrier-free, provided that a barrier-free washroom is available within a reasonable distance (45 m) of one that is not and that the location of that barrier-free washroom is clearly indicated as required by Sentence 3.8.3.1.(3).

Clause 3.8.2.3.(3)(b) is intended to address "strip malls" (a shopping mall with no public corridor). Section 3.7, which requires plumbing facilities, does not address the concept of suite and could permit, for instance, a shopping mall containing only Group E occupancies (assuming the mall is more than 100 m²) to have only one washroom for each sex located in any one of the suites. It is desirable however that such washrooms be located so as to be accessible at all times, since the owner or tenant of one suite has no control over the activities of another. Such buildings may either provide public barrier-free washrooms in a central location or washrooms which can accommodate disabled persons in each suite. This arrangement relieves any one tenant from having to provide "public" washrooms. Hence, the exception for suites of less than 300 m² is meant as a relaxation to avoid an unnecessary burden on small facilities but should not be construed as meaning that such buildings need not provide accessible washrooms.

A-3.8.3.1. Accessibility Signs.

The official symbol, as shown in Figure 3.8.3.1.A below, indicates to persons with disabilities that they will have reasonable freedom of movement within the building to which it is attached. It usually has a blue background, but if, because of lighting conditions, it does not stand out, it can be set on a white background. An arrow can be added to either side or to the top or bottom to indicate direction or the location of an accessible space or facility.

An international sign, shown in Figure A-3.8.3.1.B, indicating accessibility for persons with hearing disabilities, should be used to indicate the availability of variable volume controls on telephones, assistive listening systems, and text telephones (TT). These latter devices may also be referred to as teletypewriters (TTY) or telecommunications devices for the deaf (TDD).

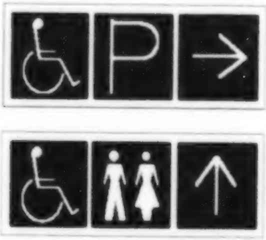


Figure A-3.8.3.1.A
Signs Indicating Accessible Facilities

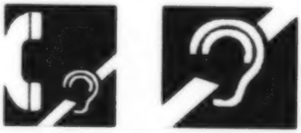


Figure A-3.8.3.1.B
Signs for Assistive Listening Facilities

A-3.8.3.3.(1) Doorway Width.

Standard wheelchair width specifications indicate a range of sizes from 584 mm overall to 685 mm overall. Every doorway that is located in a barrier-free path of travel must have a clear width of not less than 850 mm when the door is in the open position and therefore it is important that this dimension be measured correctly. Figure A-3.8.3.3.(1) shows a door opened to 90°. It is clear that the door, and to a lesser extent the stop, impinges on the space within the door frame. The clear width of not less than 850 mm is measured from the face of the door to the outside edge of the stop on the door frame. It is not sufficient just to measure the inside width of the door frame. Other factors, including location of door stops other than on the door frame, and the installation of door closers and exit devices, should be taken into account. The intrusion of a door handle into the space is of lesser importance. It is recognized that there are many types of door frame and door mounts but the overall objective is to maintain a clear width of not less than 850 mm. The diagram depicts a somewhat restrictive scenario, as many doors can open wider than 90°, however, a door smaller than 874 mm would not be wide enough to ensure the minimum clear width of 850 mm that is required. The intent of this requirement is to permit the use of standard 915 mm (3 ft) doors.

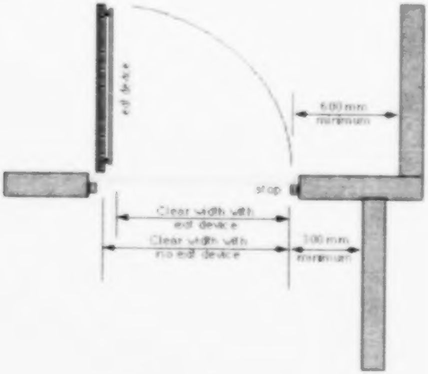


Figure A-3.8.3.3.(1)
Clear Doorway Width

A-3.8.3.3.(2) Washrooms and Bedrooms in Residential Occupancies.

This requirement ensures that the doorway to the washroom and the bedrooms in a dwelling unit or a hotel/motel suite is at least large enough to accommodate someone using a wheelchair. The Code does not require these washrooms (except the 10% required by Sentence 3.8.2.1.4) and Article 3.8.2.4.) to be barrier-free, in order to avoid a set of prescriptive requirements which could limit design flexibility. It is relatively simple to make washrooms accessible through careful planning and positioning of fixtures and this can be achieved in an area not much larger than that of conventional washrooms.

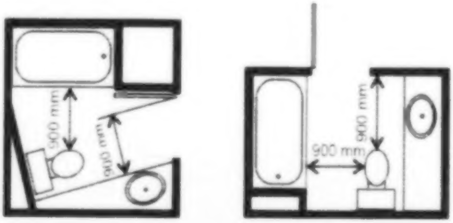


Figure A-3.8.3.3.(2)
Residential Washrooms

A-3.8.3.3.(3) Lever Handles.

Lever handles are useable by most persons with limited hand mobility and will meet the intent of this requirement. Lever handles with an end return towards the door are less prone to catch the clothing of someone passing through the doorway.

A-3.8.3.3.(5) Doors with Power Operators.

Doors equipped with a power operator activated by a pressure plate identified with the international symbol for accessibility or, where security is required, by a key, card or radio transmitter, and that can otherwise be opened manually meet the intent of the requirement. The location of these activating devices should ensure that a wheelchair will not interfere with the operation of the door once it is activated.

Swinging doors equipped with power operators which are activated automatically and open into passing pedestrian traffic should be provided with a guard or other device designed to prevent pedestrians from stepping in the swing area of the door. These guards or devices should be detectable by blind persons. For example, inverted U-shaped guards should have an additional rail at a height not more than 680 mm so that it is detectable by the long cane. These doors should also have a device (mat or other sensor) on the swing side to prevent the door from opening if someone is standing in the swing area.

A-3.8.3.3.(8) Air Pressure Differences.

Differences in air pressure on opposite sides of a door may be due to the operation of mechanical systems such as those associated with smoke control. So-called "stack action" in buildings in winter can also cause differential pressures due to the buoyancy of warm air. Stack action is usually most noticeable between stairwells and the remainder of the building, and at the entrances to buildings; the taller the building, the greater the effect. Doors with automatic closers have to operate with sufficient opening forces to allow the return action to overcome the differential pressure.

A-3.8.3.3.(9) Delayed Action on Door Closers.

In some circumstances, closers with a delay feature which keep the door open for several seconds before it begins to close might be desirable. However, closers with this feature have limited back-check, a feature of a normal door closer where resistance to opening increases as the door reaches the full arc of swing. Doors equipped with this type of closer are more susceptible to damage should the door be opened with too much force or should someone try to force it closed, thinking the closer has failed to operate. Delayed action closers are not recommended for such occupancies as schools.

a) A-3.8.3.3.(10) Clearances at Doorways.

Sufficient clearance must be provided on the latch side of doors for a user to operate the door opening mechanism and open the door without interference from the wheelchair. This is particularly important where the door swings toward the approach side.

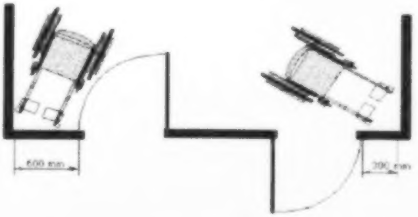


Figure A-3.8.3.3.(10)
Doorway Clearance

A-3.8.3.4.(1)(b) Ramp Slopes.

Ramps with a gradient of more than 1 in 16 can be very difficult for disabled persons with upper body mobility to manage. Even though they pose less of a problem for people in motorized wheelchairs, such ramps can be unsafe to descend, especially in cold climates. Although Article 3.8.3.4. permits slopes on ramps as great as 1 in 12 for distances of up to 9 m, gradients of 1 in 20 are safer and less strenuous. When limited space is available, as may be the case during renovations, ramps of up to 1 in 12 should be restricted to lengths not exceeding 3 m whenever possible.

A strip contrasting in colour and texture should be used at the top and bottom of ramps to warn blind and visually impaired persons.

A-3.8.3.4.(1)(c) Landing Design at Doorways Leading to Ramps.

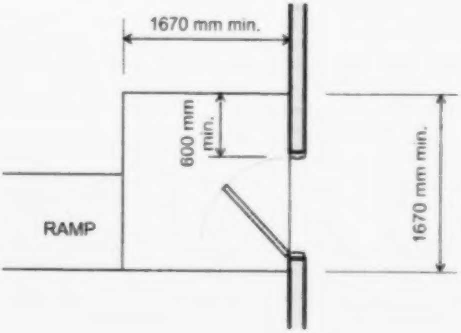


Figure A-3.8.3.4.(1)(c).A
Landing Design at Doorway Leading to Ramps

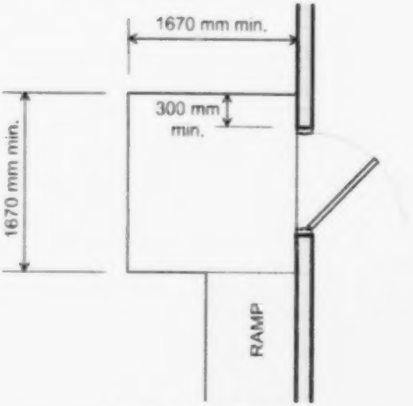


Figure A-3.8.3.4.(1)(c).B
Landing Design at Doorway Leading to Ramps

A-3.8.3.4.(3) Floors or Walks to be Designed as Ramps.

In an assembly room with fixed seating on a sloped floor, such as a theatre, the limitation on floor slope is intended to apply only to the required barrier-free access leading to spaces for wheelchair users described in Sentence 3.8.2.1.(3) and not to aisles and portions of floors serving only fixed seating for ambulatory persons.

A-3.8.3.7. Assistive Listening Devices.

Wireless sound transmission systems, such as FM, infrared or magnetic induction loop, improve sound reception for the hard of hearing by providing amplification which can be adjusted by each user while blocking out unwanted background noise. These systems transmit a signal that is picked up by special receivers available for use by people with a hearing impairment, whether or not they use a hearing aid. Neither system interferes with the listening enjoyment of others.

The transmitter can be jacked into an existing P.A. system amplifier or used independently with microphones. The induction loop system requires users to sit in the area circumscribed by the loop; though installation of the loop is relatively simple, the installer should be knowledgeable about these systems if proper functioning is to be achieved. FM or infrared systems can be designed to broadcast signals which cover the entire room and, thus do not restrict seating to any one area. Figures 3.8.3.7.A and 3.8.3.7.B show the general configuration of FM and infrared systems. Although portable systems (FM in particular) are available, these are best suited to small audiences. Generally, the systems installed in church halls, auditoria, theatres and similar places of assembly are not easily portable, as they are installed in a fixed location by a sound technician and form an integral part of the P.A. system of the room or building.

Hard wired systems (where a jack is provided at a particular seat) will not meet this requirement unless adequate provisions are made to accommodate persons with hearing aids. In choosing the most appropriate system, a number of factors must be taken into account including cost, installation and maintenance, suitability to the audience, ease of operation and the need for privacy. Information on designers and suppliers of these systems may be obtained from such organizations as the Canadian Hearing Society.

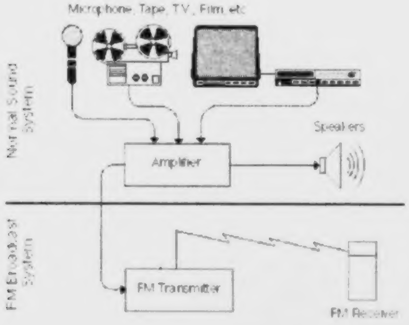

Microphone, Tape, TV, Film etc
Normal Sound System
Speakers
Amplifier
FM Broadcast System
FM Transmitter
FM Receiver

Figure A-3.8.3.7.A
FM Sound Transmission System

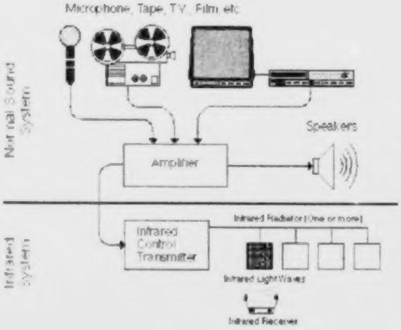

Microphone, Tape, TV, Film etc
Normal Sound System
Speakers
Amplifier
Infrared System
Infrared Control Transmitter
Infrared Radiator (One or more)
Infrared Light Waves
Infrared Receiver

Figure A-3.8.3.7.B
Infrared Sound Transmission System

A-3.8.3.8.(1)(b)(iii) Water Closet Stalls.

Doors to water closet stalls for persons with disabilities should swing outward and preferably against a side wall.

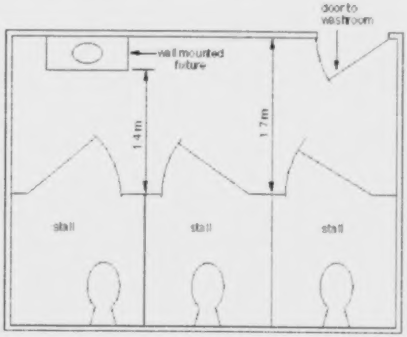

door to washroom
wall mounted fixture
1.4 m
1.7 m
stall
stall
stall

Figure A-3.8.3.8.(1)
Water Closet Stalls

A-3.8.3.8.(1)(b)(iv) Door Pulls.

The door pull should consist of a D-shaped handle mounted either horizontally or vertically. The centrelines are the lines drawn through the long axis and the short axis of the handle. If the handle is installed in the horizontal position, the short or transverse axis is the centerline which must be located at between 200 and 300 mm from the hinged side of the door, and the long or longitudinal axis is the one which is located between 900 and 1 000 mm from the floor. If the handle is installed in the vertical position, the distance is measured from the longitudinal axis to the hinged side of the door, while the distance from the floor is measured to the transverse axis.

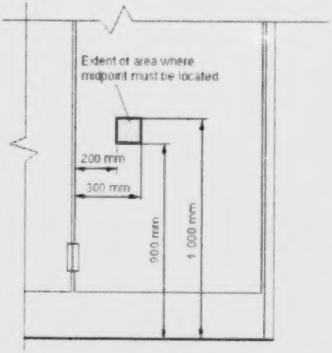

Extent of area where midpoint must be located
200 mm
300 mm
900 mm
1 000 mm

Figure A-3.8.3.8.(1)(b)(iv).A
Door Pull Location

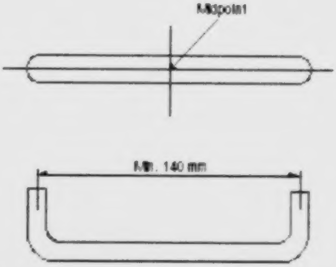

Midpoint
Min. 140 mm

Figure A-3.8.3.8.(1)(b)(iv).B
Door Pull Details

A-3.8.3.8.(1)(d)(i) Additional Grab Bars.

It is the designer's prerogative to exceed the minimum requirements found in the Building Code and specify the installation of additional grab bars in other locations. These additional grab bars may be of different configurations and can be installed in other orientations.

A-3.8.3.9.(1) Water Closets.

Wall-mounted water closets or floor models with receding bases are preferable because they provide the least amount of obstruction.

A-3.8.3.11.(1)(c) Clearances Beneath a Lavatory.

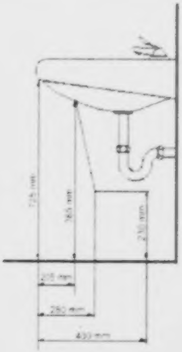


Figure A-3.8.3.11.
Clearances Beneath a Lavatory

A-3.8.3.11.(1)(d) Pipe Protection.

The pipes referred to in Clause 3.8.3.11.(1)(d) include both supply and waste pipes. The hazard can be prevented by insulating the pipes, by locating the pipes in enclosures, or avoided by limiting the temperature of the hot water to a maximum of 45°C.

a1 A-3.8.3.12. Universal Toilet Rooms.

Unobstructed areas in front of the lavatory, in front of the water closet and on one side of the water closet are necessary for manoeuverability of a wheelchair.

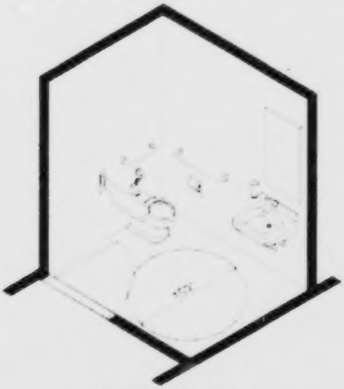


Figure A-3.8.3.12.A
Universal Toilet Room with Inward Swing Door

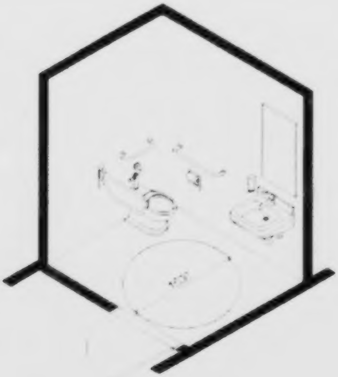


Figure A-3.8.3.12.B
Universal Toilet Room with Outward Swing Door

A-3.8.3.13.(1)(b) Clear Space at Entrances to Showers.

The clear space at the entrance to a shower may be encroached upon by fixtures such as a wall hung sink which does not interfere with the leg rests of the wheelchair. However, this sink could restrict movement for persons who need to make a lateral transfer if it were installed at the seat end of the shower.

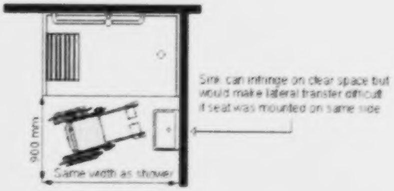

Sink can infringe on clear space but
would make lateral transfer difficult
if seat was mounted on same side
900 mm
Same width as shower

Figure A-3.8.3.13.(1)(b)
Shower Design

A-3.8.3.13.(1)(f) Grab Bars.

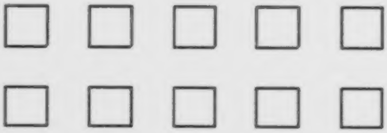
Only one grab bar is required, to be installed on the wall next to the seat: a grab bar behind the seat prevents the user from leaning against the wall, while one located on the wall opposite the seat cannot be reached from the seated position. The seat itself may be used in conjunction with the bar for transfer. If design flexibility is required, fold away grab bars can be used as an alternative.

A-3.8.3.15. Telephone Shelves or Counters.

Built-in shelves or counters for public telephones must be designed to accommodate persons using text telephones (TT). These devices may also be referred to as teletypewriters (TT) or telecommunication devices for the deaf (TDD). These devices require a level surface at least 350 mm deep by 250 mm wide with no obstruction above that space within 250 mm. If a wall-hung telephone or other obstruction extends to less than 250 mm from the shelf or counter, an equivalent clear space must be provided on either side of each telephone. At least one telephone should be equipped with a volume control on a receiver that generates a magnetic field compatible with the T-switch of a hearing aid. The lower portion of the shelf or counter is intended for persons using a wheelchair; therefore all parts of the operating mechanism of the telephone above this portion should be within the reach of a wheelchair user.

A-3.9.3. Portable Classrooms

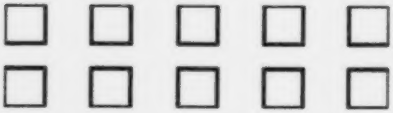
Case 1



Distance between classrooms: 6 m or more
3.2.2. applies to each classroom
3.2.3. does not apply between classrooms

Extinguisher required
Access: street; hydrant; fire alarm: - not required

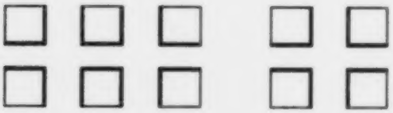
Case 2



Distance between classrooms: less than 6 m
3.2.2. applies to each classroom
3.2.3. applies to each classroom
i.e. rating and construction of facing walls determined by limiting distance

Extinguisher required
Access: street; hydrant; fire alarm: - not required

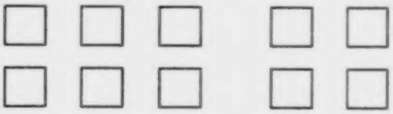
Case 3



Distance between classrooms: less than 6 m
No. of classrooms in group: 6 max.
Distance between groups: not less than 12 m
3.2.2. applies to each group
3.2.3. does not apply between classrooms within a group if the facing walls have a rating of 45 min. on the inside
3.2.3. applies between groups

Extinguisher required
Access: street; hydrant; fire alarm - not required

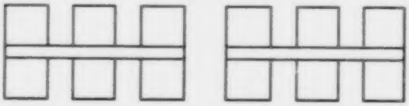
Case 4



Distance between classrooms: less than 6 m (19 ft 8 in)
No. of classrooms in group: 6 max.
Distance between groups: not less than 12 m (39 ft 4 in)
3.2.2. applies to each group
3.2.3. does not apply between classrooms within a group
3.2.3. applies between groups

Extinguisher required
Fire alarm required (extension of main system)
Access: street; hydrant; - not required

Case 5



Distance between classrooms: less than 6 m
No. of classrooms in group: 6 max.
Distance between groups: not less than 12 m
3.2.2. applies to each group
3.2.3. does not apply between classrooms within a group
3.2.3. applies between groups

Extinguisher required
Fire alarm required (extension of main system)
Access; street; hydrant; - not required

All other cases require: - Fire extinguisher
- Access
- Street
- Hydrant
- Fire alarm: extension of existing system

A-3.14. Tents and Air-Supported Structures.

The requirements in this Subsection are intended to be limited to certain types of structure. For instance, the word "tent" as used in the Code is intended to refer to a temporary shelter which is used at an open air event such as a fair or an exhibition. A tent will normally be constructed of a fabric held up by poles and attached to the ground by ties. The requirements for tents, however, are not intended to be applied to fabric structures located on buildings.

The term "air-supported structure", as used in the Code, refers to an envelope which is held up by air pressure alone and which is erected on the ground or on a building. The structure will usually require ballast or a positive anchorage system around the entire perimeter to secure it to the ground or building structure.

A-3.16.1.7.(7) Exits and Means of Egress from Shelf and Rack Storage Systems.

The fundamental principle of providing sufficient exits and means of egress from a shelf and rack storage system is to have the occupants reach an open public thoroughfare, a separate building, or an exterior open space protected from fire exposure from the building and having an access to an open public thoroughfare before the environment in the building becomes life threatening.

In addition to the time-based egress calculation, the professional engineer or architect undertaking the time-based egress analysis, must also undertake a detailed fire dynamics evaluation of the occupancy to determine when critical life threatening levels are reached. Temperature, toxic conditions and psycho-physiological characteristics of the occupants will play an important roll in the analysis.

A-4.1.1.3.(1) Structural Integrity.

The requirements of Part 4, including the CSA design standards, generally provide a satisfactory level of structural integrity. Additional considerations may, however, be required for building systems made of components of different materials, whose interconnection is not covered by existing CSA design standards, buildings outside the scope of existing CSA design standards, and buildings exposed to severe accidental loads such as vehicle impact or explosion. Further guidance can be found in the Commentary entitled "Structural Integrity" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.1.3.(2) Serviceability.

Information on serviceability can be found in the Commentary entitled "Deflection and Vibration Criteria for Serviceability and Fatigue Limit States" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

a1 A-4.1.1.4.(2) Structural Equivalents.

Sentence 4.1.1.4.(2) provides for the use of design methods not specified in Part 4, including full-scale testing and model analogues. This provision is usually used to permit the acceptance of newer and innovative structures or to permit the acceptance of model tests such as those used to determine structural behaviour, or snow or wind loads. Sentence 4.1.1.4.(2) specifically requires that the level of safety and performance be at least equivalent to that provided by design to Part 4 and requires that loads and designs conform to Section 4.1.

Sentence 4.1.1.4.(2) and the provision for alternative solutions stated in Clause 1.2.1.1.(1)(b) of Division A are not intended to allow structural design using design standards other than those listed in Part 4. The acceptance of structures that have been designed to other design standards would require the designer to prove to the appropriate authority that the structure provides the level of safety and performance required by Clause 1.2.1.1.(1)(b) of Division A. The equivalence of safety and performance can only be established by analyzing the structure for the loads and load factors set out in Section 4.1. and by demonstrating that the structure at least meets the requirements of the design standards listed in Sections 4.3. and 4.4.

A-4.1.2.1. Loads and Effects.

Information on the definitions can be found in the Commentary entitled "Limit States Design" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.2.1.(l) Temperature Changes.

Information on effects due to temperature changes can be found in the Commentary entitled "Effects of Deformations in Building Components" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A.4.1.2.1.(3) Major Occupancies.

In a building containing more than one major occupancy and classified in more than one Importance Category, the classification of each independent structural system shall be the same as for any part of the building that is dependent on that structural system and for the highest usage group according to Table 4.1.2.1.

a1 A-Table 4.1.2.1.B. Importance Categories for Buildings.

Low Importance Category Buildings

Low human-occupancy farm buildings are defined in the National Farm Building Code of Canada 1995 as having an occupant load of 1 person or less per 40 m^2 of floor area. Minor storage buildings include only those storage buildings that represent a low direct or indirect hazard to human life in the event of structural failure, either because people are unlikely to be affected by structural failure, or because structural failure causing damage to materials or equipment does not present a direct threat to human life.

Buildings Containing Hazardous Materials

The following buildings contain sufficient quantities of toxic, explosive or other hazardous substances to be classified in the High Importance Category of use and occupancy:

- petrochemical facilities,
- fuel storage facilities (other than those required for post-disaster use), and
- manufacturing or storage facilities for dangerous goods.

The following types of buildings may be classified in the Normal Importance Category: buildings that are equipped with secondary containment of toxic, explosive or other hazardous substances, including but not limited to, double-wall tanks, dikes of sufficient size to contain a spill, or other means to contain a spill or a blast within the property boundary of the facility and prevent the release of harmful quantities of contaminants to the air, soil, groundwater, surface water or atmosphere, as the case may be.

A-4.1.3. Limit States Design.

Information on limit states design can be found in the Commentary entitled "Limit States Design" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-Table 4.1.3.2. Load Combinations.

One of the combinations that must be considered is the principal load acting alone.

A-4.1.3.2.(2) Load Combinations.

The load combinations in Table 4.1.3.2. apply to most situations for loadbearing building structures. Guidance on special situations such as load combinations for fire resistance and building envelopes is given in the Commentary entitled "Limit States Design" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.3.2.(3) Effects of Lateral Earth Pressure, H, Pre-stress, P, and Imposed Deformation, T, in Design Calculations.

Effects of Lateral Earth Pressure, H, in Design Calculations

For common building structures below ground level, such as walls, columns and frames, 1.5 H is added to load combinations 2 to 4. For cantilever retaining wall structures, see the Commentary entitled "Limit States Design" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

Effects of Pre-stress, P, and Imposed Deformation, T, in Design Calculations

e_1 For structures and building envelopes designed in accordance with the requirements specified in the standards listed in Section 4.3., with the exception of Clauses 8 and 18 of CSA A23.3, P and T need not be included in the load combinations of Table 4.1.3.2. For structures not within the scope of the standards listed in Section 4.3., including building envelopes, P and T must be taken into account in the design calculations. For recommended load combinations including T, see the Commentary entitled "Limit States Design" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.3.2.(4) Overturning, Uplift or Sliding.

Information on overturning, uplift and sliding can be found in the Commentary entitled "Limit States Design" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.3.3.(1) Failure due to Fatigue.

Failure due to fatigue of building structures referred to in Section 4.3. and designed for serviceability in accordance with Article 4.1.3.6. is, in general, unlikely except for girders supporting heavily used cranes, on which Article 4.1.5.12. provides guidance.

A-4.1.3.3.(2) Vibration Effects.

Guidance on vibration effects can be found in the Commentary entitled "Deflection and Vibration Criteria for Serviceability and Fatigue Limit States" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.3.4.(1) Loads and Load Combinations for Serviceability.

The loads and load combinations for serviceability depend on the serviceability limit states and on the properties of the structural materials. Information on loads and load combinations for the serviceability limit states, other than those controlled by deflection, can be found in the Commentary entitled "Deflection and Vibration Criteria for Serviceability and Fatigue Limit States" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.3.5.(1) Deflections.

Serviceability criteria for deflections that cause damage to non-structural building components can be found in the standards listed in Section 4.3. Information on deflections can be found in the Commentary entitled "Deflection and Vibration Criteria for Serviceability and Fatigue Limit States" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*. Information on loads and load combinations for calculating deflection can be found in the Commentary entitled "Limit States Design" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.3.5.(3) Lateral Deflection of Buildings.

The limitation of 1/500 drift per storey may be exceeded if it can be established that the drift as calculated will not result in damage to non-structural elements. Information on lateral deflection can be found in the Commentary entitled "Wind Load and Effects" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.3.6.(1) Floor Vibration.

Information on floor vibration can be found in the Commentary entitled "Deflection and Vibration Criteria for Serviceability and Fatigue Limit States" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*. Information on loads and load combinations for the calculation of vibration can be found in the Commentary entitled "Limit States Design" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.3.6.(2) Dynamic Analyses of Floor Vibrations.

Information on a dynamic analysis of floor vibrations from rhythmic activities can be found in the Commentary entitled "Deflection and Vibration Criteria for Serviceability and Fatigue Limit States" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.3.6.(3) Lateral Vibration Under Wind Load.

Information on lateral vibrations and accelerations under dynamic wind loads can be found in the Commentary entitled "Wind Load and Effects" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

e1 A-4.1.4.1.(6) Counteracting Dead Load Due to Soil.

Examples of structures that traditionally employ the dead load of soil to resist loadings are pylon signs, tower structures, retaining walls, and deadmen, which resist wind uplift and overturning in light structures.

A-Table 4.1.5.3. Considerations for Live Loads.

Attics - Limited Accessibility

Attic live loading is not required when the ceiling below the attic consists of removable panels that permit access to the ceiling space without loading the ceiling supporting members. Attic live loading is not required in any area of the attic where the least dimension of the attic space is less than 500 mm.

Floor Areas That Could Be Used As Viewing Areas

Some interior balconies, mezzanines, corridors, lobbies and aisles that are not intended to be used by an assembly of people as viewing areas are sometimes used as such; consequently, they are subject to loadings much higher than those for the occupancies they serve. Floor areas that may be subject to such higher loads must, therefore, be designed for a loading of 4.8 kPa.

A-4.1.5.9. Tributary Area.

Information on tributary area can be found in the Commentary entitled "Tributary Area" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-Table 4.1.5.10. Loads Due to Concentrations.

Special study is required to determine concentrated loads for the design of floors and areas used by vehicles exceeding 9 000 kg gross weight, and of driveways and sidewalks over areaways and basements. Where appropriate, the designer should refer to CAN/CSA-S6, "Canadian Highway Bridge Design Code."

A-4.1.5.12. Crane-Supporting Structures.

Guidance on crane-supporting structures can be found in CAN/CSA-S16, "Limit States Design of Steel Structures."

A.4.1.5.15. and 4.1.5.16.(1) Design of Guards.

In the design of guards, due consideration should be given to the durability of the members and their connections.

A.4.1.5.18. Loads on Firewalls.

Information on loads on firewalls can be found in the Commentary entitled "Structural Integrity of Firewalls" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.6.2. Coefficients for Snow Loads on Roofs.

Information on coefficients for snow loads on roofs can be found in the Commentary entitled "Snow Loads" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.6.2.(4)(b) Unit Weight of Snow.

Information on the unit weight of snow can be found in the Commentary entitled "Snow Loads" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.6.3.(2) Full and Partial Loading under Snow Loads.

Information on full and partial snow loading on roofs can be found in the Commentary entitled "Snow Loads" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.6.4.(1) Rain Loads.

Information on rain loads can be found in the Commentary entitled "Rain Loads" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.6.4.(3) Flow Control Drains.

Part 7 contains requirements regarding the use of flow control roof drains. The designer must ensure that the building complies with both Part 4 and Part 7.

A.4.1.7.1.(1) to (3) Pressure Coefficients for Wind Loads.

Information on pressure coefficients can be found in the Commentary entitled "Wind Load and Effects" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

4-4.1.7.1.(5)(a) to (c) Simple Procedure for Calculating C_e.

Information on the simple procedure for calculating C_e can be found in the Commentary entitled "Wind Load and Effects" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.7.1.(5)(d) Dynamic Approach for Wind Loads.

Information on a dynamic approach can be found in the Commentary entitled "Wind Load and Effects" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A 4.1.7.1.(6)(a) Gust Effect Factor for the Building as a Whole and Main Structural Members.

Information on the gust effect factor for the building as a whole and for the main structural members can be found in the Commentary entitled "Wind Load and Effects" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A 4.1.7.1.(6)(c) Gust Factors for Calculation of Internal Pressures.

Information on gust factors for the calculation of internal pressures can be found in the Commentary entitled "Wind Load and Effects" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.7.1.(6)(d) and 4.1.7.2.(1)(b) Dynamic Approach to the Action of Wind Gusts.

Information on a dynamic approach to the action of wind gusts can be found in the Commentary entitled "Wind Load and Effects" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.7.3.(1) Full and Partial Loading under Wind Loads.

Information on full and partial loading under wind loads can be found in the Commentary entitled "Wind Load and Effects" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.8.2.(1) Notation.

Definition of e_x

Information on the calculation of torsional moments can be found in the Commentary entitled "Design for Seismic Effects" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

Definition of W

Information on the definition of dead load, W, can be found in the Commentary entitled "Design for Seismic Effects" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.8.3.(4) General Design of the SFRS.

Information on the general design requirements for the SFRS can be found in the Commentary entitled "Design for Seismic Effects" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.8.3.(6) General Design of Stiff Elements.

Information on the general design requirements for stiff elements can be found in the Commentary entitled "Design for Seismic Effects" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.8.3.(7)(b) and (c) Stiffness Imparted to the Structure from Elements Not Part of the SFRS.

Information on stiffness imparted to the structure from elements not part of the SFRS can be found in the Commentary entitled "Design for Seismic Effects" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.8.3.(8) Structural Modelling.

Information on structural modelling can be found in the Commentary entitled "Design for Seismic Effects" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.8.4.(3) and Table 4.1.8.4.A. Site Class.

Information on Site Class can be found in the Commentary entitled "Design for Seismic Effects" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-Table 4.1.8.5. Serviceability Limit States for Earthquake.

Information on serviceability limit states for earthquake can be found in the Commentary entitled "Design for Seismic Effects" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-Table 4.1.8.6. Structural Irregularities.

Information on structural irregularities can be found in the Commentary entitled "Design for Seismic Effects" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.8.7.(1) Dynamic Analysis Procedures.

Information on dynamic analysis procedures can be found in the Commentary entitled "Design for Seismic Effects" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.8.9.(4) Vertical Variations in R_dR_o.

Information on vertical variations in R_dR_o can be found in the Commentary entitled "Design for Seismic Effects" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.8.9.(5) R_dR_o and Equivalent Systems.

Information on the R_dR_o, of equivalent systems can be found in the Commentary entitled "Design for Seismic Effects" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.8.11.(3) Determination of the Fundamental Period, T_a.

Information on the determination of the fundamental period, T_a, can be found in the Commentary entitled "Design for Seismic Effects" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.8.12.(1)(a) Linear Dynamic Analysis.

Information on Linear Dynamic Analysis can be found in the Commentary entitled "Design for Seismic Effects" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.8.12.(1) (b) Nonlinear Dynamic Analysis.

Information on Nonlinear Dynamic Analysis can be found in the Commentary entitled "Design for Seismic Effects" in the *User's Guide - NRC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.8.12.(3) Ground Motion Histories.

Information on ground motion histories can be found in the Commentary entitled "Design for Seismic Effects" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.8.1 2.(4)(a) Accidental Torsional Moments.

Information on accidental torsional moments can be found in the Commentary entitled "Design for Seismic Effects" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.8.13.(4) Deflections and Sway Effects.

Information on deflections and sway effects can be found in the Commentary entitled "Design for Seismic Effects" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.8.15.(1) Diaphragms and their Connections.

Information on diaphragms and their connections can be found in the Commentary entitled "Design for Seismic Effects" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.8.15.(2) Discontinuities.

Information on elements supporting discontinuities can be found in the Commentary entitled "Design for Seismic Effects" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.8.1 5.(3) Vertical Variations in R_dR_o.

Information on elements of the SFRS below the variation in R_dR_o can be found in the Commentary entitled "Design for Seismic Effects" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.8.15.(4) Concurrent Yielding.

Information on the effects of concurrent yielding of elements can be found in the Commentary entitled "Design for Seismic Effects" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.8.1 5.(5) Design Force in Elements.

Information on the design force in elements can be found in the Commentary entitled "Design for Seismic Effects" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.8.16.(1) Rocking Foundations.

Information on foundations that are allowed to rock can be found in the Commentary entitled "Design for Seismic Effects" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.8.16.(3)(a) Interconnection of Foundation Elements.

Information on the interconnection of piles or pile caps, drilled piers, and caissons can be found in the Commentary entitled "Design for Seismic Effects" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.8.16.(4) Earthquake Lateral Pressures from Backfill or Natural Ground.

Information on methods of computing the seismic lateral pressures from backfill or natural ground can be found in the Commentary entitled "Design for Seismic Effects" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.8.16.(5)(a) Cyclic Inelastic Behaviour of Foundation Elements.

Information on the cyclic inelastic behaviour of piles or pile caps, drilled piers, and caissons can be found in the Commentary entitled "Design for Seismic Effects" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.8.16.(6) Alternative Foundation Ties.

Alternative methods of tying foundations together, such as a properly reinforced floor slab capable of resisting the required tension and compression forces, may be used. Passive soil pressure against buried pile caps may not be used to resist these forces.

A-4.1.8.16.(7) Liquefaction.

Information on liquefaction can be found in the Commentary entitled "Design for Seismic Effects" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.1.8.17.(8)(f) Ductile Connections.

Information on ductile connections can be found in the Commentary entitled "Design for Seismic Effects" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.2.2.1.(1) Subsurface Investigation.

Where acceptable information on subsurface conditions already exists, the investigation may not require further physical subsurface exploration or testing.

A-4.2.4.1.(1) Innovative Designs.

It is important that innovative approaches to foundation design be carried out by a person especially qualified in the specific method applied and that the design provide a level of safety and performance at least equivalent to that provided for or implicit in the design carried out by the methods referred to in Part 4. Provision must be made for monitoring the subsequent performance of such structures so that the long-term sufficiency of the design can be evaluated.

A-4.2.4.1.(3) Ultimate Limit States for Foundations.

Information on ultimate limit states for foundations, including terminology and resistance factors, can be found in the Commentary entitled "Foundations" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.2.4.1.(5) Design of Foundations for Differential Movements.

Information on the design of foundations for differential movements can be found in the Commentary entitled "Foundations" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.2.4.4.(1) Depth of Foundations.

When adfreezing has occurred and subsequent freezing results in soil expansion beneath this area, the resulting uplift effect is sometimes referred to as frost jacking.

A heated building that is insulated to prevent heat loss through the foundation walls should be considered as an unheated structure unless the effect of the insulation is taken into account in determining the maximum depth of frost penetration.

A-4.2.5.1.(1) Excavations.

Information on excavations can be found in the Commentary entitled "Foundations" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.2.6.1.(1) Shallow Foundations.

Information on shallow foundations can be found in the Commentary entitled "Foundations" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.2.7.1.(l) Deep Foundation Units.

A deep foundation unit can be pre-manufactured or cast-in-place; it can be driven, jacked, jetted, screwed, bored or excavated; it can be of wood, concrete or steel or a combination thereof.

A-4.2.7.2.(1) Deep Foundations.

Information on deep foundations can be found in the Commentary entitled "Foundations" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

A-4.2.7.2.(2) Load Testing of Piles.

ASTM D 1143, "Piles Under Static Axial Compressive Load," defines routine load test procedures that have been extensively used.

A-4.3.3.1.(1) Precast Concrete.

CSA A23.3, "Design of Concrete Structures," requires precast concrete members to conform to CAN/CSA-A23.4, "Precast Concrete - Materials and Construction."

A-4.3.4.1.(1) Welded Construction.

Qualification for fabricators and erectors of welded construction is found in Clause 24.3 of CAN/CSA-S16, "Limit States Design of Steel Structures."

A-4.3.4.2.(1) Cold-Formed Stainless Steel Members.

There is currently no Canadian standard for the design of cold-formed stainless steel structural members. As an interim measure, design may be carried out using the limit states design provisions of ANSI/ASCE 8, "Design of Cold Formed Stainless Steel Structural Members," except that load factors, load combinations and load combination factors shall be in accordance with Subsection 4.1.3.

A-5 Environmental Separation.

The requirements provided in Part 5 pertain to the separation of environmentally dissimilar spaces. Most obvious is the need to separate indoor conditioned spaces from unconditioned spaces, the outdoors or the ground. There are also cases where separation is needed between interior spaces which are intended to provide different environments. (See also Appendix Notes A-5.1.1.1.(1) and A-5.1.2.1.(1).)

A-5.1.1.1.(1) Scope.

Part 5 provides explicit requirements related to the transfer of heat, air, moisture and sound in various forms. Control of the ingress of radon and other soil gases is addressed by the requirements related to air leakage.

A-5.1.2.1.(1) Application.

Subsection 1.1.2. of Division A specifies that Part 5 applies to all buildings except those within the scope of Part 9 or the scope of the National Farm Building Code of Canada. Because of their intended use, many buildings need only provide a limited degree of separation from the outdoor environment, the ground, or between interior spaces. The provisions in Part 5 are written to allow exemptions for these buildings.

Part 5 applies to building elements that separate dissimilar environments and to site conditions that may affect environmental loading on the building envelope.
The provisions address

- the design and construction, or selection, of building components, such as windows and doors,
- the design and construction of building assemblies, such as walls, floors and roofs,
- the design and construction of the interfaces between the above-mentioned elements, and
- the design or selection, and installation, of site materials, components and assemblies, such as backfill and drainage, and grading.

Part 5 applies not only to building elements that separate indoor space from outdoor space, but also to those elements that separate indoor space from the ground and that separate adjacent indoor spaces having significantly different environments. Indoor spaces that require separation include interior conditioned spaces adjacent to indoor unconditioned spaces, and adjacent interior conditioned spaces that are intended to provide different environments. An extreme example of the last would be a wall that separates an indoor ice rink from a swimming pool.

Some building elements are exposed to exterior environmental loads but do not separate dissimilar environments. Solid guards on exterior walkways are one example. Such elements are subject to the application of Part 5.

A-5.1.4.1. Application of Structural Design to Other Building Elements.

Part 4, as currently written, applies primarily to buildings as a whole and to structural members. Requirements defining structural loads and design to accommodate or resist those loads, however, apply not only to buildings as a whole and components that are traditionally recognized as structural members, but also apply to other elements of the building that are subject to structural loading. This is addressed to some extent in Part 4 by the requirements that pertain, for example, to wind loads on cladding. A range of structural loads and effects, as defined in Subsection 4.1.2., may be imposed on non-loadbearing elements such as backing walls, roofing, interior partitions and their connections. These must generally be addressed using the same load determination and structural design procedures as used for structural members.

Responsibility for the structural design of buildings as a whole and their structural members is commonly assigned to the designer of record. The application of Part 4 reflects this, and as such, "non-structural" elements are not explicitly identified in the Part 4 provisions. Rather, the application of Part 4 to these elements is specified in cross-references from other Parts of the Code, e.g. Part 5, which recognizes the fact that the structural design of these elements is often carried out by designers other than the designer of record.

Part 4 applies to the design of the connections of building services to address earthquake loads (see Article 4.1.8.17.).

A-5.1.4.1.(4) Past Performance as Basis for Compliance with Respect to Structural Loads.

As discussed in Appendix Note A-5.1.4.1., a range of structural loads and effects can be imposed on materials, components and assemblies in environmental separators and assemblies exposed to the exterior. In many instances, compliance with Sentence 5.1.4.1.(1) for structural loads must be determined based on the loads and calculation methods described in Part 4 as specified in Sentence 5.1.4.1.(2) and the referenced Subsection 5.2.2., e.g. for cladding. In practice, compliance for some materials, components or assemblies of environmental separators and assemblies exposed to the exterior is determined by relying on provisions governing the use of alternative solutions (such as Clause 1.2.1.1.(1)(b) of Division A and formerly Section 2.7. in the 1997 edition of the Building Code).

For some very common building elements and installations, however, there is a very large body of evidence of proven performance over a long period of time. In these cases, imposing the degree of analysis, or documentation of performance, required by Part 4 or Section 2.1. of Division C would be unnecessary and onerous. Clause 5.1.4.1.(4)(b) is intended to address these particular cases. Because these common building elements and assemblies are so widely accepted throughout the industry and the body of evidence is so substantial (though not necessarily documented in an organized fashion), detailed analysis or documentation is unnecessary.

Whether compliance of a particular material, component or assembly may be determined based on past performance depends not only on the type of material, component or assembly, but also on its intended function, the particular loads to which it will be subject and the magnitude of those loads. Because the possible number of combinations and permutations is astronomical, only guidelines can be provided as to when past performance is a reasonable basis for determining compliance.

In determining compliance based on past performance, the period of past performance considered should be a substantial number of years. For example, 30 years is often used to do life-cycle cost analysis of the viability of investments in building improvements. This period is more than long enough for most deficiencies to show up. There should be no question as to the structural adequacy of a material, component or assembly that has been successfully used in a given application for such a period.

The determination of compliance may be based on past performance only where the function of the material, component or assembly is identical to that of the materials, components or assemblies used as a reference, and where the expected loads do not exceed those imposed on the reference materials, components or assemblies. For example, the acceptance of gypsum board, and its fastening, to serve as part of the backing wall supporting cladding cannot be based on the performance of gypsum board that has served only as an interior finish.

The determination of compliance may be based on past performance only where the properties of the material, component or assembly are identical or superior to those of the materials, components or assemblies used as a reference. For example, where a component of a certain gauge of a particular metal has provided acceptable performance, the same component made of the same metal or a stronger one would be acceptable.

Compliance with respect to various loads may be determined individually. A particular material may have to be designed to Part 4 to establish acceptable resistance to wind or earthquake loads, for example, but past performance may be adequate to determine that the material and normal fastening will support the material's dead load and will resist loads imposed by thermal and moisture-related expansion and contraction.

Past performance is a reasonable basis for determining compliance for lighter materials, components or assemblies not subject to wind load: for example, semi-rigid thermal insulation installed in wall assemblies where other materials, components or assemblies are installed to resist air pressure loads.

Past performance is an appropriate basis for determining compliance for some smaller elements that will be subject to wind loads but are continually supported or fastened behind elements that are designed for wind loads, for example, standard flashing over wall penetrations.

It should be noted that this particular approach to demonstrating compliance pertains only to the resistance or accommodation of structural loads described in Part 4. The resistance or accommodation of environmental loads, resistance to deterioration, and material compatibility must still be addressed in accordance with Part 5.

A.5.1.4.1.(5)(b) and (c) Deflection.

e_1 It is well understood that the deflection of the backing assembly in a wall can have significant effects on the performance of the cladding. For example, Clauses 9.14.3 and 10.14.3 of CSA S304.1, "Design of Masonry Structures", specifies the maximum deflection criteria for backing assemblies to masonry veneer. Clauses 5.1.4.1.(5)(b) and (c) are written in very general terms in recognition of the fact that not only can the deflection of cladding affect the performance of the backing assembly, but that the excessive deflection of any element has the potential to adversely affect the performance of any adjacent element. Such effects must be avoided or accommodated.

A-5.1.4.2. Deterioration.

Environmental loads that must be considered include but are not limited to: sound, light and other types of radiation, temperature, moisture, air pressure, acids and alkalis.

Mechanisms of deterioration include:
- structural (impact, air pressure)
- hygrothermal (freeze-thaw, differential movement due to thermal expansion and contraction, ice lensing)
- electrochemical (oxidation, electrolytic action, galvanic action, solar deterioration)
- biochemical (biological attack, intrusion by insects and rodents).

Information on the effects of deformations in building elements can be found in the Commentary entitled "Effects of Deformations in Building Components" in the *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*.

Resistance to deterioration may be determined based on field performance, accelerated testing or compliance with guidelines provided by evaluation agencies recognized by the authority having jurisdiction.

Building components must be designed with some understanding of the length of time over which they will effectively perform their intended function. Actual service life will depend on the materials used and the environment to which they are exposed. The design should take into consideration these factors, the particular function of the component and the implications of premature failure, the ease of access for maintenance, repair or replacement, and the cost of repair or replacement.

Many buildings are designed such that access for maintenance, repair or replacement is not possible without damaging-or seriously risking damaging-other building elements. This can become a considerable deterrent to proper maintenance thus compromising the performance of the subject materials, components and assemblies, or other elements of the building. In cases where it is known or expected that maintenance, repair or replacement is likely to be required for certain elements before such time as the building undergoes a major retrofit, special consideration should be given to providing easy access to those elements.

Where the use of a building or space, or the services for a building or space, are changed significantly, an assessment of the impact of the changes on the environmental separators should be conducted to preclude premature failures that could create hazardous conditions.

e_1 A-5.2.1.1.(3) Soil Temperatures.

In theory, soil temperatures are needed to determine the conformance of a design to the requirements related to heat transfer and vapour diffusion. In practice, standard construction in a particular area may have proven to perform quite adequately and detailed calculations of soil temperature are unnecessary. (See also Sentence 5.2.1.3.(2).)

A-5.2.1.2.(1) Interior Environmental Loads.

The interior environmental conditions required depend on the intended use of the spaces in the building as defined in the building program. Spaces in different types of buildings and different spaces within a single building may impose different loads on the separators between interior and exterior spaces and between adjacent interior spaces. The separators must be designed to withstand the expected loads.

A-5.2.2.2. Resistance to Wind and Other Air Pressure Loads.

The wind load provisions apply to roofing and other materials subject to wind-uplift loads.

Note that, although Article 5.2.2.2. is specifically concerned with wind loads and directly references only two Sentences from Part 4, Sentence 5.2.2.1.(1) references all of Part 4 and would invoke Article 4.1.7.4. for example, that is concerned with air pressure loads on interior walls and partitions.

A-5.3. Heat Transfer.

In addressing issues related to health and safety, Section 5.3. calls up levels of thermal resistance needed to minimize condensation on or within environmental separators, and to ensure thermal conditions appropriate for the building use. Part 12 specifies levels of thermal resistance required for energy efficiency or calls up energy performance levels, which relate to levels of thermal resistance. Where Part 5 calls for levels of thermal resistance higher than those required by Part 12, the requirements of Part 5 take precedence.

A-5.3.1.1. Required Resistance to Heat Transfer.

The control of heat flow is required wherever there is an intended temperature difference across the building assembly. The use of the term "intended" is important since, whenever interior space is separated from exterior space, temperature differences will occur.

The interior of an unheated warehouse, for example, will often be at a different temperature from the exterior due to solar radiation, radiation from the building to the night sky and the time lag in temperature change due to the thermal mass of the building and its contents. If this temperature difference is not "intended," no special consideration need be given to the control of heat flow.

If the warehouse is heated or cooled, thus making the temperature difference "intended," some consideration would have to be given to the control of heat flow.

It should be noted, however, that in many cases, such as with adjacent interior spaces, there will be an intended temperature difference but the difference will not be great. In these cases, the provisions to control heat flow may be little or no more than would be provided by any standard interior separator. That is, materials typically used in the construction of partitions may provide the separation needed to meet the requirements of Section 5.3. without adding what are generally considered to be "insulating" materials.

A-5.3.1.2. Material and Component Properties and Condensation.

Total prevention of condensation is generally unnecessary and its achievement is rarely a certainty at design conditions. Part 5, therefore, requires that condensation be minimized. The occurrence of condensation should be sufficiently rare, or the quantities accumulated should be sufficiently small and dry rapidly enough, to avoid material deterioration and the growth of mould and fungi.

A-5.3.1.2.(1) Use of Thermal Insulation or Mechanical Systems for Environmental Control.

The level of thermal resistance required to avoid condensation on the warm side of an assembly or within an assembly (at the vapour barrier) and to permit the maintenance of indoor conditions appropriate for the occupancy depends on:

- the occupancy
- the exterior design air temperature
- the interior design air temperature and relative humidity

- the capacity of the heating system, and
- the means of delivering heat.

e_1 To control condensation on the interior surface of an exterior wall, for example, the interior surface must not fall below the dew point of the interior air. If, for instance, the interior air is 20°C and 35% RH, the dew point will be 4°C. If the interior air is 20°C and 55% RH, the dew point will be 6°C.

Exterior design temperatures are low in Ontario; for example, -20°C in Toronto, and -35°C in Geraldton. In these cases, maintaining temperatures inboard of the vapour barrier above the dew point requires insulation.

In addition to controlling condensation, interior surface temperatures must be warm enough to avoid occupant discomfort due to excessive heat loss by radiation. Depending on the occupancy of the subject spaces, this may require the installation of insulation even where it is not needed to control condensation.

A-5.3.1.2.(3) Heat Transfer through Fire-Rated Glazed Assemblies.

Thermal bridging through fire-rated glazed assemblies should not be ignored; measures should be taken to minimize condensation consistent with the intent of Sentence 5.3.1.2.(2).

A-5.3.1.3.(2) Position of Materials Providing Thermal Resistance.

For a material providing thermal resistance to be effective, it must not be short-circuited by convective airflow through or around the material. The material must therefore be either the component of the air barrier system providing principal resistance to air leakage, or installed in full and continuous contact with a continuous low air permeance component.

A-5.4.1.1. Resistance to Air Leakage.

An air barrier system in above-grade building components and assemblies separating conditioned space from the exterior will reduce the likelihood of condensation due to air leakage, discomfort from drafts, the infiltration of dust and other pollutants, and interference in the performance of building services, such as HVAC and plumbing. These problems can all lead to serious health or safety hazards.

Currently, the most obvious and significant problems are due to moisture-related material deterioration, such as rot and corrosion, which can lead to the failure of component connections. The infiltration of dust and other pollutants can lead to a wide range of health problems. Where the separator is subject to high moisture levels, the pollutants may include fungus spores. Interference with the performance of building services can lead to unhealthy conditions and potentially hazardous conditions during the heating season in many regions of the province.

There are few buildings intended for human occupancy where the interior space is conditioned but where an air barrier system is not required. Some industrial buildings, for example, may be exempt. This would depend, however, on the particular levels of interior conditioning provided, ventilation levels, protection provided for the workers, and the tolerance of the building's construction to the accumulation of condensation and potential precipitation ingress.

Some industrial buildings are provided with only limited conditioning, for example radiant heating, and ventilation levels are sufficient to reduce relative humidity to a level at which condensation will not accumulate to a degree that is problematic. Conversely, some industrial buildings, due to the processes they contain, operate at very high temperatures and high ventilation levels. In these cases, the building envelope will be maintained at temperatures that will avoid condensation. In both examples above, either the ventilation rates or protective gear required in the work environment would protect the occupants from unacceptable levels of pollutants.

Where adjacent interior environments are sufficiently different, controlling airflow between those spaces is necessary to maintain conditions. Referring again to the industrial building examples above, assemblies separating office space from the work floor would likely require an air barrier system.

An air barrier system may be required in components and assemblies in contact with the ground to control the transfer of soil gases such as radon and methane.

The word "minimize" is used in Sentence 5.4.1.1.(1) because not all moisture accumulation in an assembly need be of concern. Incidental condensation is normal but should be sufficiently rare and in sufficiently limited quantities, and should dry rapidly enough, to avoid material deterioration and the growth of mould or fungi.

A-5.4.1.2.(1) and (2) Air Leakage through the Air Barrier System.

Material Requirements

The current requirements specify only a maximum air leakage rate for the material in the air barrier system that provides the principal resistance to air leakage.

The report, "Air Permeance of Building Materials," prepared by AIR-INS Inc. for CMHC (1988) identifies, from 36 common building materials, 19 that would comply with the leakage limit of 0.02 L/(s•m^2) at 75 Pa. Air leakage characteristics greater than the maximum of 0.02 L/(s•m^2) at 75 Pa may be acceptable where

- exterior temperatures are mild,
- the moisture content of the indoor air is low,
- the assembly is resistant to moisture-related deterioration,
- higher vapour permeance materials are installed toward the cold side of the assembly, or
- the air barrier system separates two interior spaces that are not intended to provide significantly different environments.

System Requirements

Ideally, a maximum air leakage rate for the complete air barrier system would be specified. The maximum acceptable rate will ultimately depend on warm and cold side temperatures and humidity conditions, and on the susceptibility of the environmental separator to moisture-related deterioration. Recommended maximum leakage rates for the air barrier system in an exterior envelope in most locations in Ontario are shown in Table A-5.4.1.2.(1) and (2). These values are for air barrier systems in opaque, insulated portions of the building envelope. They are not for whole buildings, as windows, doors and other openings are not included. The Table is provided for guidance when testing air barrier systems as portions of an envelope.

Table A-5.4.1.2.(1) and (2)
Recommended Maximum Air Leakage Rates

Warm Side Relative Humidity at 21°C	Recommended Maximum System Air Leakage Rate, L/(s•m^2) at 75 Pa
< 27%	0.15
27% to 55%	0.10
> 55%	0.05

Determining the leakage rate of a particular assembly, however, is problematic. There is little information available on the airtightness of the many air barrier systems used in building construction, and testing requires specialized equipment and expertise. Depending on the type of test,

- testing may not represent the performance of the complete installed system,
- the location of deficiencies may be difficult to identify, and
- rectification of deficiencies may not be feasible.

Despite the difficulties, when using a system whose performance is not known, it is recommended that tests be conducted. Testing options include:

- laboratory tests of small sections of the air barrier system, including the joints and intersections of different assemblies
- laboratory tests of large wall sections
- in-situ tests of characteristic envelope areas.

A-5.5.1.1. Required Resistance to Vapour Diffusion.

Resistance to vapour diffusion is required to reduce the likelihood of condensation within building assemblies, and the consequent potential for material deterioration and fungal growth. Deterioration such as rot and corrosion can lead to the failure of building components and connections, and interfere with the performance of building services. Some fungi can have very serious effects on health.

In Ontario, relatively few buildings that are subject to temperature and vapour pressure differences would be constructed or operated in such a manner that the control of vapour diffusion would not need to be addressed in their design. Assemblies enclosing certain industrial spaces, as described in Appendix Note A-5.4.1.1. for example, may be exempt.

For residential spaces and most other spaces that are conditioned for human occupancy, a means of vapour diffusion control is generally agreed to be necessary. The questions in those cases pertain to the degree of control needed.

The word "minimize" is used in Sentence 5.5.1.1.(1) because not all moisture accumulation in an assembly need be of concern. Incidental condensation is normal but should be sufficiently rare and in sufficiently limited quantities, and should dry rapidly enough, to avoid material deterioration and the growth of mould or fungi. The following publications address the effects of fungi on health:

- Fungal Contamination in Public Buildings: A Guide to Recognition and Management. Federal Provincial Committee on Environmental and Occupational Health, Health Canada, Ottawa, 1995
- Guidelines on Assessment and Remediation of Fungi in Indoor Environments. New York City Department of Health, 2000.

A-5.5.1.2.(1) Vapour Barrier Materials and Installation.

In the summer, many buildings are subject to conditions where the interior temperature is lower than the exterior temperature. Vapour transfer during these periods is from the exterior to the interior. In general, in Canada, the duration of these periods is sufficiently short, the driving forces are sufficiently low, and assemblies are constructed such that any accumulated moisture will dissipate before deterioration will occur.

Buildings such as freezer plants, however, may operate for much of the year at temperatures that are below the ambient exterior temperature. In these cases, the "warm" side of the assembly would be the exterior and a detailed analysis on an annual basis is required.

Steady state heat transfer and vapour diffusion calculations may be used to determine acceptable permeance levels for the vapour barrier and to identify appropriate positions for the vapour barrier within the building assembly.

A-5.6.1.1. Required Protection from Precipitation.

Windows, cast-in-place concrete walls, and metal and glass curtain wall systems are examples of components and assemblies that, when properly designed and constructed, are expected to prevent the ingress of precipitation into a building. Assemblies such as roofs and veneer walls consist of materials specifically intended to screen precipitation.

Components and assemblies separating interior conditioned space from the exterior are generally required to provide protection from the ingress of precipitation. Components and assemblies separating interior unconditioned space from the exterior may or may not be required to provide protection from the ingress of precipitation. Buildings such as stadia, parking garages and some seasonally occupied buildings, for example, may not require complete protection from the ingress of precipitation. The degree of protection will depend to a large extent on the materials selected for the building elements that will be exposed to precipitation.

The word "minimize" is used in Sentence 5.6.1.1.(1) because not all moisture ingress or accumulation in an assembly need be of concern. The penetration of wind-driven rain past the cladding may not affect the long-term performance of the assembly, provided the moisture dries out or is drained away before it initiates any deterioration of building materials. When the design service life of a material or component is longer than the design service life of the overall assembly, taking into account the expected exposure to moisture, initiating deterioration of the material should not be of concern. That is to say, provided the material or component continues to provide the necessary level of performance for its intended service life and does not adversely affect the service life of the assembly of which it is a part, the deterioration of the material or component is not an issue.

A-5.6.1.3.(3) Ice Damming.

Water leakage through sloped roofs is often due to the formation of ice dams at the eaves, which can be limited by controlling the transfer of heat to the roof through a combination of insulation and venting to dissipate heat. See Clause 5.3.1.2.(1)(d).

A-5.6.2.1. Sealing and Drainage.

Providing a surface-sealed, durable, watertight cover on the outside of a building is difficult. Where there is a likelihood of some penetration by precipitation into a component or assembly, drainage is generally required to direct the moisture to the exterior.

The degree of protection against precipitation ingress needed in any particular case and the approach taken to provide that protection will depend on
- the exterior loads imposed on the assembly
- the materials selected for the backing assembly,
- the use of the enclosed space, and
- the level of maintenance that will be acceptable to the owners.

Where exterior loads are greater, it may be prudent to select a precipitation protection system whose small failures will not be as likely to have an immediate impact on the building or its occupants. Basic rainscreen assemblies, for example, are typical for low-rise residential buildings. Open rainscreen assemblies are generally used for high-rise buildings where the cost of maintenance and repair could be high.

Where materials with a greater resistance to moisture are used in the assembly, a less rugged precipitation protection system or a less rigorous maintenance schedule may be acceptable. This might be the case, for example, where the wall or backing wall is concrete or masonry.

For spaces that are not intended for on-going human occupancy, some rainwater leakage may not be of particular concern. This may be the case for certain warehouse spaces for example, depending on how the spaces are used and conditioned.

Information on the installation of flashing to drain water to the exterior of roof and wall assemblies may be found in a number of publications including, but not limited to:
- "Architectural Sheet Metal Manual," Sheet Metal and Air-Conditioning Contractors National Association, Inc.
- "High-Rise Residential Construction Guide," Ontario New Home Warranty Program
- Technical Notes, National Concrete Masonry Association
- Roofing Specifications, Canadian Roofing Contractors' Association
- "Roofing and Waterproofing Manual," National Roofing Contractors Association
- Technical Notes on Brick Construction, Brick Industry Association

A-5.8.1.1.(1) Required Drainage.

A wall or floor located below the water table or in the path of a watercourse will be subject to continuous hydrostatic pressure. In such cases, the provision of drainage will be ineffective and the wall or floor must be made waterproof to prevent water ingress.

Where a wall or floor is subject to intermittent hydrostatic pressure, as may result from seasonal flooding, proper drainage will facilitate the drying out of the soil. In some cases, reducing exposure to high moisture levels will extend the life of the moisture protection.

Where a wall or floor is not subject to hydrostatic pressure, drainage again reduces the exposure to high moisture levels and allows less than waterproof treatment of the wall or floor.

A-5.8.2. Moisture Protection.

Moisture protection for building elements in contact with the ground is generally categorized as either waterproofing or dampproofing. Waterproofing provides a continuous protection against water ingress and is intended to resist hydrostatic load. Dampproofing, on the other hand, does not provide a seal against water ingress and cannot withstand hydrostatic pressure.

In general, Part 5 requires walls, floors and roofs in contact with the ground to be waterproofed. Properties of waterproofing are specified in Sentences 5.8.2.2.(2) to (5), and waterproofing material standards are referenced in Table 5.10.1.1. Materials intended to be used as dampproofing rather than waterproofing are generally not permitted [Sentence 5.8.2.2.(6)]. Standards for installing waterproofing are also specified [Sentence 5.8.2.3.(1)].

Part 5 permits the use of dampproofing in lieu of waterproofing where the substrate is cast-in-place concrete, a drainage layer is installed and where the assembly will not be exposed to hydrostatic pressure. Material standards are referenced in Clause 5.8.2.2.(7)(b) and installation methods in Sentence 5.8.2.3.(2).

A-5.8.2.1. Required Moisture Protection.

The control of the ingress of moisture from the ground into interior space is not related to the type of building, the use of the space, or whether or not the space is conditioned. This recognizes the potential adverse effects of high humidity levels, with or without standing water, on both the health of the building occupants and the durability of the building structure.

Although a subject interior space may not be occupied, the assembly separating this space from occupied space often cannot be relied upon to provide adequate protection for the building occupants. Depending on the construction of the separating assembly, it may also be subject to moisture-related deterioration.

The exceptions to this requirement stated in Sentence 5.8.2.1.(2) recognize only those cases where the subject interior space is not occupied and where the assembly separating this space from occupied space will provide the required protection and be resistant to a high humidity environment, or where the moisture loads are sufficiently limited as to not adversely affect the building or its occupants.

A-5.8.2.2.(7) Drainage Layers.

Drainage layers reduce both structural and moisture loading on the building envelope by breaking capillary flow and allowing water to percolate quickly to the drainage system. A drainage layer may consist of permeable materials including granular backfill, geosynthetic drainage products or mineral fibreboard with oriented fibres to facilitate drainage. Where a granular material is used, it should be protected from contamination by fines from the adjacent native soil or additional material should be installed to ensure that an adequate thickness of the granular material remains free of fines.

A-5.9. Required Protection from Noise.

Sentence 5.9.1.2.(1) applies to the separation of dwelling units from other dwelling units with regard to sound transmission irrespective of Clause 5.1.2.1.(1)(b), which deals with the separation of dissimilar environments. It is understood that, at any time, there is the potential for sound levels to be quite different in adjoining dwelling units.

A-5.9.1.1.(1) Sound Transmission.

The Tables in Supplementary Standard SB-3 provide information on the typical sound transmission class ratings of a number of building assemblies. In the absence of test information or results for a specific assembly of materials, the values in these Tables are considered to satisfy the intent of Sentence 5.9.1.1.(1).

A-5.10.1.1.(1) Selection of Materials and Components and Compliance with Referenced Standards.

Note that Sentence 5.10.1.1.(1) is drafted in such a way that the selection of materials and components is not limited to those traditionally recognized as serving particular functions or those for which a standard is identified in Table 5.10.1.1. This approach permits more flexibility than is provided by similar requirements in Part 9. As long as the selected material meets the performance requirements stated elsewhere in Part 5, the material may be used to serve the required function.

However, where the selected material or component, or its installation, falls within the scope of any of the standards listed in Table 5.10.1.1., the material, component or installation must comply with that standard. For example, if some resistance to heat transfer is required between two interior spaces and standard partition construction will provide the necessary resistance, the installation of one of the "thermal insulation" materials identified in the standard list is not required. If, on the other hand, one decides to install glass fibre insulation, the material must conform to CAN/ULC-S702, "Mineral Fibre Thermal Insulation for Buildings."

A-5.10.1.1.(3) Airtightness and Watertightness of Wired Glass Windows.

Fixed wired glass assemblies are sometimes permitted as closures in vertical fire separations. The airtightness and watertightness requirements are waived for these windows when used in such an application, in recognition of the fact that the availability of assemblies that meet both the requirements of the window standards and the requirements for fire resistance may be limited. However, control of air and water leakage should not be ignored; measures should be taken to attempt to comply with applicable requirements.

A-6 Crawl Spaces Used as Warm Air Plenums

The requirements for crawl spaces used as warm air plenums have not been included in this Part. Crawl spaces may be used as warm air plenums if design measures are taken to prevent moisture, soil or radon gases from entering the crawl space and being distributed throughout the space.

A-6.1.1.1.(2) Repairs and Alterations.

This requirement is to ensure that minimum life safety and health requirements are maintained when the operation and/or design is modified on existing heating, ventilating or air-conditioning systems. For example, this provision would apply to such cases as

(a) the conversion of a heating appliance from oil to gas where venting and clearance requirements differ for chimneys and

(b) the branching of a new duct from a main supply duct in which the new duct now penetrates a fire separation.

A-6.2.1.3. Structural Movement.

This article is intended to remind designers and installers of mechanical systems of one aspect of the "good engineering practice" referred to in Article 6.2.1.1. In determining how to accommodate structural movement, there are two important principles to bear in mind:

- The prime concern of the Code is the safety of people in and around the building, as opposed to protection of the mechanical systems and equipment.
- The nature of the accommodation will vary with the type of movement being considered, taking into account particularly how often the movement is likely to be encountered over the life of the building.

For example, a gas line supported on columns that also support a crane must be installed in such a way that the movement of the columns, which occurs many times daily, does not cause the lines to break, thus creating a hazard. Even if the gas line installation could somehow be designed to break in a non-hazardous manner, it would hardly be recognized as good engineering practice if movement that occurs so frequently could disrupt the operation of the mechanical system.

On the other hand, earthquakes occur far less frequently and it would not be surprising to have a non-critical mechanical system fail as a result of an earthquake. However, even in this situation, the failure must occur in a manner that does not create a hazard to building occupants. For example, heavy mechanical equipment should be properly anchored so that it does not topple on building occupants during an earthquake. The design of the anchors should take into account accelerations consistent with the seismic data given in Supplementary Standard SB-1 for the location of the building. Part 4 provides guidance on the calculation of the loads such equipment would exert on the building structure during an earthquake; these same loads can be used in designing the anchors.

Some mechanical equipment can be an important component of post-disaster life safety systems. In these cases, the measures needed to accommodate the movements caused by an earthquake become even more critical since failure of the equipment would not be acceptable. Clearly, complying with this requirement will, in most cases, necessitate close coordination between the mechanical designer and the structural designer.

A-6.2.1.8.(1) Installation - General.

Ducts or pipes without dampers or valves are generally not considered to constitute "equipment" and are therefore not subject to this requirement.

A-6.2.2.1.(2) Minimum Flow Rate of Outdoor Make-up Air.

Except for self-contained mechanical ventilation systems serving a dwelling unit, the minimum flow rate of outdoor make-up air is listed in Table 2. of the ASHRAE 62 "Ventilation for Acceptable Indoor Air Quality" Standard. These values have been chosen to control air contaminants with an adequate margin of safety and to account for health variations among people, and varied activity levels.

A-6.2.2.1.(3) Self-Contained Mechanical Ventilation Systems.

When self-contained mechanical ventilation systems are to be designed under Part 6 instead of Subsection 9.32.3., the reference to Subsection 9.32.3. for conformance is intended to ensure that the principle design objectives of Subsection 9.32.3. (including total ventilation capacity, fan ratings, energy efficiency ratings for heat recovery ventilators, etc.) are met using good engineering practice criteria found in Part 6.

A-6.2.2.3.(2) Ventilation of Storage Garages.

Storage garages are ventilated to protect occupants from exposure to carbon monoxide and other vehicular exhaust fumes. In certain cases, such as small two- or three-bay storage garages that are used for occasional vehicle storage, and where occupants are not present, carbon monoxide or nitrogen dioxide monitoring devices may be omitted if the ventilation system is interlocked with a local light switch or other controls to ensure continuous system operation whenever the area is occupied. In any event, the ventilation system capacity must be designed to limit the concentrations of carbon monoxide or nitrogen dioxide at or below the prescribed values.

A-6.2.2.4.(1) Remove of Contaminants.

While it is preferable to remove contaminants to the outdoors, if filtering devices are provided and are specifically designed for the purpose to clean the air to an acceptable indoor air quality limit, the cleaned air may be reused.

A-6.2.2.4.(2) Air Contaminants.

Shafts that constitute air ducts or that enclose air ducts used for the movement of environmental air shall not enclose

(a) exhaust ducts used for the removal of smoke- and grease-laden vapours from cooking equipment,
(b) ducts used for the removal of flammable vapours,
(c) ducts used for moving, conveying, or transporting stock, vapour or dust,
(d) ducts used for the removal of non-flammable corrosive fumes and vapours
(e) refuse and linen chutes, or
(f) piping (except noncombustible piping conveying water or other nonhazardous or nontoxic materials).

A-6.2.2.4.(3) Minimizing Growth of Micro-organisms.

Sources for microbial growth causing hypersensitivity pnuemontis and humdifier fever include drain pans, spray-water air-washers, contaminated filters, poorly maintained cooling coils, water incursion into ductwork, cafeteria dishwater drainage leaks, high humidity and stagnant water. Some of the control measures are as follows:

(a) Drain pans should be pitched toward the drain outlet and the outlet bottom should be flush with the drain pan bottom, otherwise there will be standing water in the pan, exposed to the supply air passing through the cooling section of the air-handling unit.

(b) Access into air-handling equipment should be provided for maintenance of filters, cooling coils and condensate drain pans located below the cooling coils. Access doors should be large and easy to open to facilitate thorough and regular maintenance. Hinged access doors are preferable to bolted access panels.

(c) If moisture is added to commercial building ventilation air (such as hospital operating rooms and dedicated computer rooms) to maintain humidity levels in a designated range (for example, 40% to 50% relative humidity), humidifiers that inject steam or water vapour into central air-handling units or main supply ducts are normally used. Injection nozzles should not be located in air-handling unit plenums or ductwork that is insulated with internal fibrous lining. If the lining becomes wet, conditions conducive to microbial growth will result.

The above only addresses built-in features of an HVAC system that can help to minimize growth of mirco-organisms. Even more important than the built-in features is a program of regular maintenance and cleaning of those portions of the system where such growth is likely to occur.

A-6.2.2.5.(1) NFPA Publications Pertaining to the Heating, Ventilating and Air-Conditioning of Spaces Containing Hazardous Gases, Dusts or Liquids.

NFPA 30, Flammable and Combustible Liquids Code.
NFPA 32, Drycleaning Plants.
NFPA 33, Spray Application Using Flammable and Combustible Materials.
NFPA 34, Dipping and Coating Processes Using Flammable or Combustible Liquids.
NFPA 35, Manufacture of Organic Coatings.
NFPA 36, Solvent Extraction Plants.
NFPA 40, Storage and Handling of Cellulose Nitrate Motion Picture Film.
NFPA 50A, Gaseous Hydrogen Systems at Consumer Sites.
NFPA 50B, Liquefied Hydrogen Systems at Consumer Sites.
NFPA 51, Design and Installation of Oxygen-Fuel Gas Systems for Welding and Cutting.
NFPA 51A, Acetylene Cylinder Charging Plants.
NFPA 61A, Fire and Dust Explosions in Facilities Manufacturing and Handling Starch.
NFPA 61B, Prevention of Fires and Explosions in Grain Elevators and Facilities Handling Bulk Raw Agricultural Commodities.
NFPA 61C, Prevention of Fire and Dust Explosions in Feed Mills.
NFPA 65, Processing and Finishing of Aluminum.
NFPA 68, Venting of Deflagrations.
NFPA 69, Explosion Prevention Systems.
NFPA 81, Fur Storage, Fumigation and Cleaning.
NFPA 85F, The Installation and Operation of Pulverized Fuel Systems.
NFPA 86, Ovens and Furnaces, Design, Location and Equipment.
NFPA 88A, Parking Structures.
NFPA 88B, Repair Garages.
NFPA 91, Installation of Blower and Exhaust Systems for Dust, Stock and Vapor Removal or Conveying.
NFPA 96, Ventilation Control and Fire Protection of Commercial Cooking Operations.
NFPA 204M, Guide for Smoke and Heat Venting.
NFPA 303, Marinas and Boatyards.
NFPA 307, Marine Terminals, Piers and Wharfs.
NFPA 321, Basic Classification of Flammable and Combustible Liquids.
NFPA 325M, Fire Hazard Properties of Flammable Liquids, Gases and Volatile Solids.
NFPA 395, Storage of Flammable and Combustible Liquids on Farms and Isolated Construction Projects.
NFPA 409, Aircraft Hangars.
NFPA 416, Construction and Protection of Airport Terminal Buildings.
NFPA 480, Magnesium, Storage, Handling.
NFPA 481, Production, Processing, Handling and Storage of Titanium.
NFPA 482, Production, Processing, Handling, and Storage of Zirconium.
NFPA 490, Storage of Ammonium Nitrate.
NFPA 650, Pneumatic Conveying Systems.
NFPA 651, Manufacture of Aluminum or Magnesium Powder.
NFPA 654, Prevention of Fire and Dust Explosions in the Chemical, Dye, Pharmaceutical, and Plastics Industries.
NFPA 655, Prevention of Sulfur Fires and Explosions.
NFPA 664, Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities.

A-6.2.2.7.(1) Ventilation and Venting of Crawl Spaces and Attic or Roof Spaces.

Sentence 6.2.2.7.(1) requires that crawl spaces be ventilated either by natural (above-grade only) or mechanical means. High moisture levels within the crawl space can lead to problems such as the formation of mould, lifting of flooring or long-term damage to structural components. Crawl space ventilation cannot be expected to correct moisture-related problems caused by other factors like inadequate surface drainage from the foundation walls or improper protection against moisture from the ground. These conditions must be properly addressed so that crawl space ventilation can meet its intended objectives.

Several factors favour the use of mechanical ventilation rather than reliance on natural drafts. Local conditions, such as areas with high water tables, may dictate the need for mechanical ventilation to remove excessive moisture.

Crawl spaces should be maintained at a negative pressure relative to the conditioned area above to prevent the migration of moisture into occupied areas. This can be achieved through the use of an exhaust fan and relying on air transfer through floor penetrations, such as pipes.

A-6.2.3.8.(5) and (6) Exhausting to Garages.

A frequent practice in the design of ventilation systems serving buildings which have associated parking garages is to discharge exhaust air from the building to the garage in order to reduce the cost of heating the garage or reduce the length of the exhaust ducts. However, this practice entails a certain amount of risk since, when the exhaust system is not running, stack effect may turn the exhaust outlets into intakes and exhaust fumes (including carbon monoxide) can be drawn from the garage into the building. Incorporating a backdraft damper at the exhaust outlet provides some additional protection but backdraft dampers are generally not regarded as being very reliable. Therefore this practice is only permitted in very limited circumstances and one needs to avoid negative pressure in the accessory rooms which are accessible only from the storage garage.

A-6.2.3.8.(6)(b) Air Contaminants.

For the purpose of Clause 6.2.3.8.(6)(b), washroom exhaust air is not considered to contain contaminants that would adversely affect the air quality in the storage garage.

A-6.2.3.8.(10)(b) Operation Diversity Factor.

The operation diversity factor has to be assessed for each specific application. Good engineering practice (see Article 6.2.1.1.) design guidelines can provide information on the subject. Figure A-6.2.3.8.(10)(b), which originates from the ASHRAE handbooks, provides an example of factors that can be used for general applications.

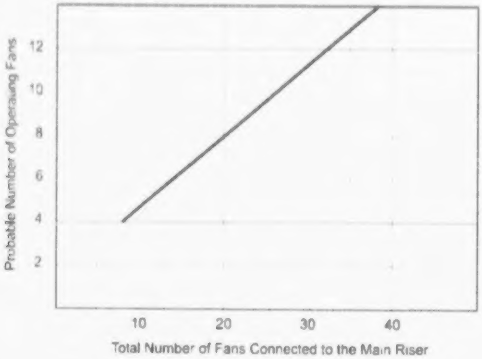


Figure A-6.2.3.8.(10)(b)
Operation Diversity Factor

A-6.2.3.12. Make-Up Air for Exhaust Systems.

When make-up air is introduced into a building in cold weather, it should be preheated when the comfort of people in the air path is a consideration.

A-6.2.4.4. Warm Air Supply Outlets.

If the heating system is designed to also distribute ventilation air, high inside wall or ceiling outlets with diffusers, and designed for such applications, may be used. In this case, low wall air-returns would be needed.

A-6.2.4.5. Concrete Slabs-on-Ground.

When the heating system is designed to provide low wall air-supply outlets with high inside wall or ceiling air-returns, and the thermal resistance of insulation are being provided in accordance with Column 4 of Table 12.3.3.3., it may be considered as sufficiency of compliance with the Code.

A-6.2.4.10. Clearances for Warm-Air Supply Ducts.

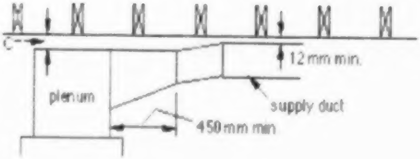


Figure A-6.2.4.10.(1)
Applicable to forced-air furnaces where permissible clearance C above plenum is 75 mm or less.

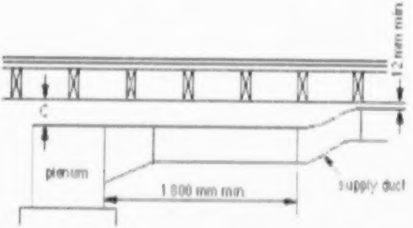


Figure A-6.2.4.10.(2)
Applicable to forced-air furnaces where permissible clearance C above plenum is more than 75 mm but not more than 150 mm.

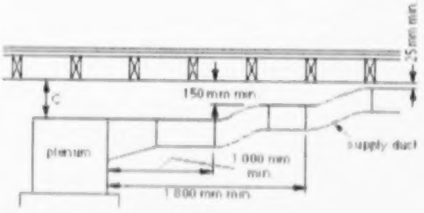


Figure A-6.2.4.10.(3)
Applicable to forced-air furnaces where permissible clearance C above plenum is more than 150 mm.

A-6.2.9.2.(6) Temperature of Exposed Piping.

Normally piping carrying steam or high-temperature hot water at pressures above atmospheric (corresponding temperature 100°C or above) will be insulated to reduce heat losses as an economy measure. Above a temperature of approximately 70°C, however, a bare pipe can cause a burn to human flesh coming in contact with the pipe. If pipes above this temperature are normally out of reach of all persons other than maintenance personnel or are properly guarded, it would be expected that no insulation would be needed for public safety.

A-7.1.5.4.(1) Separate Services.

Building sewers and water service piping serving buildings that are not located within the same property may be interconnected if the owners of the properties and the municipality enter into an agreement that is registered against the title to which it applies.

A-7.2.2.3.(1) Showers.

One method of ensuring that the floor complies with Sentence 7.2.2.3.(1) is to use a non-ferrous sheet metal or a rubber or plastic membrane and where the protected floor area adjoins a perimeter wall, the water stop shall be turned up at least 100 mm above the waste opening.

a_1 A-7.2.2.6.(1) Centre Outlet Waste Fitting.

Centre outlet waste fitting means a drain that is equipped with a flat metal strainer at the waste inlet of a tailpiece and it is commonly known as a grid drain.

A-7.2.5.3.(3) Concrete Fittings.

Concrete fittings fabricated on the site from lengths of pipe may have proven acceptable on the basis of past performances in some localities and their acceptance as an alternative solution pursuant to Section 2.1. of Division C may be warranted.

A-7.2.5.6.(1) Polyethylene Pipe Used Underground.

Joints within the high-density polyethylene pipe (HDPE) shall be heat-fused according to the manufacturer's instructions. Joints between HDPE pipes and other materials shall be made with a suitable hubless coupling.

A-7.2.5.7.(1) Crosslinked Polyethylene Pipe and Fittings.

There are some special installation requirements for the use of crosslinked polyethylene pipe and its associated fittings. Reference should, therefore, be made to the installation information in CAN/CSA-B137.5, "Cross-Linked Polyethylene (PEX) Tubing Systems for Pressure Applications".

A-7.2.5.10. to 7.2.5.12. Solvent Cement.

The CSA Standards B181.1-M, B181.2-M and B137.6 reference ASTM standard D3138, which specifies the colour of the solvent cement. PVC cement shall be grey, ABS cement shall be yellow, CPVC cement shall be clear and transition cement shall be white. The standard colour allows code users to readily determine if the correct solvent cement has been used. It should be noted that a transition cement is not an all-purpose cement.

A-7.2.5.13.(1) Polyethylene/Aluminum/ Polyethylene Composite Pipe and Fittings.

There are some special installation requirements for the use of polyethylene/aluminum/polyethylene composite pipe and fittings. Reference should, therefore, be made to the installation information in CAN/CSA-B137.9-M, "Polyethylene/Aluminum/Polyethylene Composite Pressure Pipe Systems".

A-7.2.5.14.(1) Crosslinked Polyethylene/ Aluminum/Crosslinked Polyethylene Composite Pressure Pipe and Fittings.

There are some special installation requirements for the use of crosslinked polyethylene/aluminum/crosslinked polyethylene composite pipe and fittings. Reference should, therefore, be made to the installation information in CAN/CSA-B137.10-M, "Crosslinked Polyethylene/Aluminum/Crosslinked Polyethylene Composite Pressure Pipe Systems".

A-7.2.5.15.(1) Polypropylene Pipe and Fittings.

There are some special installation requirements for the use of polypropylene pipe and fittings. Reference should, therefore, be made to the installation information in CAN/CSA-B137.11-M, "Polypropylene (PP-R) Pipe and Fittings for Pressure Applications".

A-7.2.6.7.(3) Galvanized Steel Pipe.

The use of galvanized steel pipe and fittings in a water distribution system may have proven acceptable on the basis of past performance in some localities and its acceptance as an alternative solution pursuant to Section 2.1. of Division C may be warranted.

A-7.2.10.16.(1) Air Admittance Valve.

An air admittance valve is a device that is closed by gravity and seals the vent terminal at zero differential pressure (no flow conditions) and under positive internal pressures. The valve allows air to enter the drainage system without the use of a vent extended to outside air and prevents sewer gases from leaking into the building.

The material of the diaphragm can be damaged by exposure to acids or corrosive fumes in the ambient atmosphere: therefore, air admittance valves should not be installed in locations where there is a potential for exposure to such fumes.

A-7.3.2.6.(1) Mechanical Joints.

Storm sewer blockage can cause mechanical joints at the base of leaders to fail, which can result in flooding. The failure occurs because the cleanout joints at the base of the rainwater leaders are not able to withstand the water column pressure. To avoid such failures, it is necessary to ensure that storm water systems installed using mechanical joints be braced and/or restrained at the ends of branches, changes in direction and elevation, at dead ends and at other locations as required by the manufacturer to prevent the separation of joints due to internal pressure, mechanical stress or seismic events. Care should be taken to replace cleanouts properly after maintenance or testing.

A-7.3.3.9.(1) Expansion and Contraction.

Expansion and contraction in piping systems may be accommodated in a number of ways including, but not limited to, piping design and layout, material selection, and the inclusion of expansion joints.

A-7.3.4.6.(1) Support for Underground Horizontal Piping.

Certified drain, waste and vent piping of polymeric plastic having schedule 40 dimensions shall be installed with select piping bedding where the fill over the pipe will be subject to vehicular traffic or where the burial depth exceeds eight feet.

Sewer pipe of polymeric plastic certified to a standard that requires a minimum pipe stiffness of 320 kPa shall be installed with select pipe bedding where the fill over the pipe will be subject to vehicular traffic or where the burial depth measured from the top of the pipe exceeds 750 mm.

Select pipe bedding consists of a non-cohesive ballast material of which at least 50% will pass a ¼ inch sieve and 100% will pass a ½ inch sieve, and that completely surrounds the pipe by a radial depth of at least four inches and that is sufficiently consolidated so that the intended earth loading will not produce further compaction.

A-7.3.4.9. Thrust Blocking.

Concrete thrust blocks may be used to provide restraint for underground water service piping. They are readily utilized in combination with tie rods, structural restraining, thrust collars and restrained joints. Thrust blocks are generally categorized as gravity blocks or bearing blocks. Important factors which may affect gravity block design are pipe sizes, water pressure, density of block material and allowable soil bearing pressure that will determine the minimum size of the block base. Publications of pipe and fitting manufacturers show methods for installing thrust blocks at different fittings. In each case, the trench is cut to provide a bearing surface on undisturbed soil, and concrete is placed to fit snugly against as much of the fitting as possible without interfering with access to fitting joints. Sometimes anchor rods may be used to hold the fitting against the blocks.

A-7.3.5.1. Backfilling of Pipe Trench.

Stronger pipes may be required in deep fill or under driveways, parking lots, etc., and compaction for the full depth of the trench may be necessary.

Bedding is required primarily to provide uniform and adequate longitudinal support under the pipe. All drainage pipe shall be supported in such a manner as to maintain its alignment, and prevent sagging. Blocking alone shall not be used to maintain pipe grading. Bell holes at each joint shall be provided to permit the joint to be assembled properly while maintaining uniform pipe support. A compacted depth of 100 mm to 150 mm is generally sufficient bedding thickness. Ledge or sharp rocks and clods which could damage the pipe cannot be used. In general, select pipe bedding shall consist of a non-cohesive ballast material of which at least 50% will pass a ¼ inch sieve and 100% will pass a ½ inch sieve, and that completely surrounds the pipe by a radial depth of at least 100 mm and that is sufficiently consolidated so that the intended earth loading will not produce further compaction.

A-7.3.5.4. Freeze Protection.

Piping Exposed to Freezing

No water, soil, or waste pipes shall be installed on the exterior of a building or in the uninsulated side of an exterior wall, or in any place where they may be subjected to freezing temperatures, unless adequate provision is made to protect such pipes from freezing (such as applying trace wires or insulation).

Insulation of Buried Piping

Failures in buried pipe are caused by improper installation, corrosion, poor design, soil movement caused by freeze-thaw situations, to name some of the causes. Designing for frost protection is a consideration in Ontario because all regions experience winter conditions, where temperatures drop below freezing, and it is impractical to bury piping below the depth of frost penetration, insulation may be used to protect the pipe from freezing temperatures.

There are two methods available:
(1) insulation is formed to fit around and encapsulate the pipe, or
(2) a sheet of insulation at some level above the buried pipe.

The type of backfill that is used to bury pipe is most important because this determines how the frost will pass through the backfill and penetrate the buried pipe.

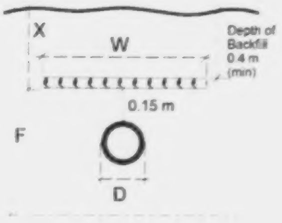
Typical Water Pipe Protection By Horizontal Insulation

The width of a sheet of insulation may be calculated using the following formula:

Width of Insulation:

$$W = D + 2\,(F - X) - 0.3$$

Where: W = Width of Insulation (m)
D = Outside Diameter of Pipe (m)
X = Insulation Depth (m)
F = Estimated Frost Depth (m)



Having calculated the width of the insulation, the thickness can be found on a chart, similar to the one shown below.

THICKNESS OF FOAM INSULATION (mm)								
Amount of Backfill over the Insulation (m)		Design Freezing Index (°C-Days)						
		850	1125	1400	1675	1950	2225	2500
	0.6	50	65	75	90	100	115	125
	0.9	40	50	65	75	90	100	115
	1.2	25	40	50	65	75	90	100
	1.5	25	25	40	50	65	75	90
	1.8	25	25	25	40	50	65	75
	2.1			25	25	40	50	65
	2.4				25	25	40	50
	2.7					25	25	40
	3						25	25

A-7.4.2.1.(4) Suds Pressure Zones.

High sudsing detergents used in clothes washers produce suds that tend to disrupt the venting system and can also spread through the lower portions of a multi-storey drainage system. The more turbulence, the greater the suds. One solution that avoids the creation of suds pressure zones involves connecting the suds-producing stack downstream of all other stacks and increasing the size of the horizontal building drain to achieve a greater flow of air and water. Using streamlined fittings, such as wyes, tends to reduce suds formation. Check valves or backwater valves in fixture outlet pipes have also been used to correct problem installations.

A-7.4.3.3.(1) Waste with Organic Solids.

Equipment such as garbage grinders and potato peelers produces waste with organic solids. These devices reduce most waste into small particles that will flow easily through the drainage system. However, if they are located upstream of the interceptor, the particles could block the interceptor.

A-7.4.4.2.(1) Protection for Drainage System.

When the temperature of the heated discharge exceeds 75°C, the material being used shall be used in accordance with the manufacturers approval and done in accordance with the manufacturers instructions. Where the material being used is a thermoplastic, care should be taken with discharges above 55°C.

A-7.4.4.3.(1) Grease Interceptors.

For large volume engineered interceptors, the drain down time may vary. Further information on the design and sizing of grease interceptors can be found in the *ASPE Date Book*, Volume 4, Chapter 8, "Grease Interceptors."

A-7.4.4.4.(1) Bio-hazardous Waste.

Chemically loaded and bio-hazardous wastes can be dangerous to private and public sewer systems and hazardous to people. the treatments of corrosive and acid waste is mandated by this Code.

The treatment of chemically loaded effluents is usually regulated by sewage collecting and treatment authorities. The treatment of bio-hazardous waste should follow good engineering practice, such as that described in the Laboratory Biosafety Guidelines published by Health Canada. Bio-hazardous waste disposal systems require specific engineering expertise and remain outside the scope of this Code.

A-7.4.6.3. Arrangement of Piping at Sump.

In most installations controls will be installed in conjunction with a float to automatically empty the sump. If such controls are not provided, the capacity of the sump should equal the maximum inflow to the sump that is expected to occur during any 24 h period.

A - 7.4.6.4.(5) Protection from Backflow Caused by Surcharge.

These requirements are intended to apply when in the opinion of the local authority having jurisdiction there is danger of backup from a public sewer.

A - 7.4.7.1.(6) Cleanouts for Drainage Systems.

A trap cleanout plug is not acceptable as a cleanout for the fixture drain; hence; either a separate cleanout or a trap with a removable trap dip must be installed.

A - 7.4.7.4.(1) Cleanouts for Fixture Drains.

To accommodate the limitations of sewer cleaning equipment, the cleanout should be located as close as possible to the exterior wall of the building, either inside or outside, and be accessible for sewer cleaning equipment.

A - 7.4.8.1.(1) Minimum Slope.

Where it is not possible to grade as set out in Sentence 7.4.8.1.(1), a lesser grade may be considered provided it can be shown that it will produce a gravity flow rate of at least 0.6 m/s.

A-Table 7.4.9.3. Hydraulic Loads.

Bathroom Group.

A bathroom group is considered to consist of 1 water closet, 1 lavatory, and 1 bath tub (with or without shower head) or a shower stall.

Hydraulic Loads for Laundry Traps.

When determining the hydraulic load on a pipe, no allowance need be made for a load from a domestic clothes washer when discharged into a laundry tray, since the hydraulic load from the laundry tray is sufficient.

Hydraulic Loads for Floor Drains.

No hydraulic load is required from a floor drain in a washroom since it is for emergency use only.

A-Table 7.4.10.5. Conversion of Fixture Units.

The following table expands Table 7.4.10.5.:

Maximum Probable Drainage Rate, gal/min

Fixture Units in Service	*Fixture Units Col. 1*	*Fixture Units Col. 1 x 10*	*Fixture Units Col. 1 x 100*
10	21	53	174
11	23	55	183
12	24	57	192
13	24	59	201
14	25	61	210
15	25	63	219
16	26	65	228
17	26	67	237
18	27	69	246
19	27	71	254
20	27	72	262
21	28	74	271
22	29	75	280
23	29	77	289
24	30	78	298
25	30	80	307
26	31	82	316
27	31	83	325
28	32	85	334
29	32	86	342
30	33	88	350
31	33	90	359
32	34	91	368
33	34	92	377
34	35	94	386
35	35	95	395
36	36	96	403
37	36	98	411
38	37	99	419
39	37	100	427
Column 1	2	3	4

Fixture Units in Service	*Fixture Units Col. 1*	*Fixture Units Col. 1 x 10*	*Fixture Units Col. 1 x 100*
40	38	102	435
41	38	103	444
42	39	104	453
43	39	106	462
44	39	107	471
45	40	108	480
46	40	110	488
47	40	111	496
48	41	112	504
49	41	114	512
50	41	115	520
51	42	116	528
52	42	118	536
53	42	119	544
54	43	120	552
55	43	122	560
56	43	123	568
57	44	124	576
58	44	126	584
59	44	127	592
60	44	128	600
61	45	129	608
62	45	130	616
63	45	131	624
64	45	133	632
65	46	134	640
66	46	135	648
67	46	136	656
68	46	138	664
69	47	139	672
Column 1	2	3	4

Fixture Units in Service	*Fixture Units Col. 1*	*Fixture Units Col. 1 x 10*	*Fixture Units Col. 1 x 100*
70	47	140	680
71	47	141	687
72	47	143	694
73	48	144	701
74	48	145	708
75	48	147	715
76	48	148	722
77	49	149	729
78	49	151	736
79	49	152	743
80	49	153	750
81	50	154	759
82	50	155	768
83	50	156	777
84	50	157	786
85	50	159	795
86	51	160	803
87	51	161	811
88	51	162	819
89	51	163	827
90	51	164	835
91	52	165	842
92	52	166	849
93	52	167	856
94	52	168	863
95	52	169	870
96	53	170	876
97	53	171	882
98	53	172	888
99	53	173	894
100	53	174	900
Column 1	2	3	4

A-7.4.10.4.(1) Rainfall Intensities.

Climate information on rainfall intensities for various localities is found in Supplementary Standard SB-1.

A-7.5.6.2. Vent Pipe Connections.

Except for wet venting, fittings used to connect vent pipes to nominally horizontal soil-or-waste pipes are specified in Subsection 7.2.4.

a1 A-7.6.1.1.(1) Design of Potable Water Systems.

The design procedures contained in the following documents are considered good engineering practice in the field of potable water systems:

(a) *2003 ASHRAE Handbook of HVAC Applications*, Chapter 45, "Control of Gaseous Indoor Air Contaminants",
(b) *1999 ASPE Data Book* - Volume 2, Chapter, 5,"Cold Water Systems", and
(c) *1999 ASPE Data Book* - Volume 2, Chapter, 6,"Domestic Water Heating Systems Fundamentals".

Alternative procedures shown below are also acceptable.

Table A-7.6.1.1.
Pipe Size Based On The Number Of Fixtures Units Served (1)

Water Service Inches	Water Distribution Inches	Maximum Allowable Length - Metres														
		12	18	24	30	46	61	76	91	122	152	183	213	244	274	305
Pressure Range		Number of Fixture Units Served														
200 to 310 kPa (30 to 45 psi)																
¾"	½"	6	5	4	3	2	1	1	1	0	0	0	0	0	0	0
¾"	¾"	16	16	14	12	9	6	5	5	4	4	3	2	2	2	1
¾"	1"	29	25	23	21	17	15	13	12	10	9	7	6	6	6	6
1"	1"	36	31	27	25	20	17	15	13	12	10	8	6	6	6	6
1"	1¼"	54	47	42	38	32	28	25	23	19	17	14	12	12	11	11
1½"	1¼"	90	68	57	48	38	32	28	25	21	18	15	12	12	11	11
1½"	1½"	151	124	105	91	70	57	49	45	36	31	26	23	21	20	20
2"	1½"	210	162	132	110	80	64	53	46	38	32	27	23	21	20	20
1½"	2"	220	205	190	176	155	138	127	120	104	85	70	61	57	54	51
2"	2"	372	329	292	265	217	185	164	147	124	96	70	61	57	54	51
2"	2½"	445	418	390	370	330	300	280	265	240	220	198	175	158	143	133
311 to 413 kPa (46 to 60 psi)																
¾"	½"	9	7	6	5	4	3	2	2	1	1	1	0	0	0	0
¾"	¾"	27	23	19	17	14	11	9	8	6	5	4	4	3	3	3
¾"	1"	44	40	36	33	28	23	21	19	17	14	12	10	9	8	8
1"	1"	60	47	41	36	30	25	23	20	18	15	12	10	9	8	8
1"	1¼"	102	87	76	67	52	44	39	36	30	27	22	20	19	17	16
1½"	1¼"	156	130	106	89	66	52	44	39	33	29	24	20	19	17	16
1½"	1½"	270	225	193	167	128	105	90	78	62	52	42	38	35	32	30
2"	1½"	286	286	242	204	150	117	98	84	67	55	42	38	35	32	30
1½"	2"	360	360	340	318	272	240	220	198	170	150	135	123	110	102	94
2"	2"	570	510	470	430	368	318	280	250	205	165	142	123	110	102	94
2"	2½"	680	640	610	580	535	500	470	440	400	365	335	315	285	267	250
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Table A-7.6.1.1. (Cont'd)
Pipe Size Based On The Number Of Fixtures Units Served (1)

Water Service Inches	Water Distribution Inches	Maximum Allowable Length - Metres														
		12	18	24	30	46	61	76	91	122	152	183	213	244	274	305
Pressure Range		Number of Fixture Units Served														
Over 413 kPa (60 psi)																
3/4"	1/2"	11	9	7	6	5	4	3	3	2	1	1	1	1	1	0
3/4"	3/4"	31	28	24	22	17	13	11	10	8	7	6	6	5	4	4
3/4"	1"	63	53	47	42	35	30	27	24	21	17	14	13	12	12	11
1"	1"	72	66	55	48	38	32	29	26	22	18	14	13	12	12	11
1"	1¼"	140	126	108	96	74	62	53	47	39	31	26	25	23	22	21
1½"	1¼"	156	156	150	127	93	74	62	54	43	34	26	25	23	22	21
1½"	1½"	286	286	273	240	186	154	130	113	88	73	51	51	46	43	40
2"	1½"	286	286	286	275	220	170	142	122	98	82	64	51	46	43	40
1½"	2"	360	360	360	360	360	335	305	282	244	212	187	172	153	141	129
2"	2"	611	611	610	560	478	420	375	340	288	245	204	172	153	141	129
2"	2½"	690	690	690	690	690	650	610	570	510	460	430	404	380	356	329
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Notes to Table A-7.6.1.1.:

(1) Branch pipes up to 7 m developed length (from main to outlet or fixture) may supply a maximum of 4 fixture units if they are half-inch nominal size and a maximum of 16 fixture units if they are three-quarter-inch nominal size.

a1 A-7.6.1.3.(6) Identification of Underground Non-metallic Pipe.

Metallic piping may be used to extend underground non-metallic water supply piping above the floor. In these cases, the metallic pipe extension should not be used for electrical grounding purposes. Therefore, it is advisable to post a permanent sign indicating "plastic piping underground - do not use for electrical grounding purposes" in a conspicuous location.

A-7.6.1.6.(1) Residential Suites.

Where multiple risers convey the water supply to dwelling units, each dwelling unit's water distribution system shall be provided with a shut-off valve located immediately where the water piping enters the suite so as to isolate the fixtures as well as the water distribution piping serving the dwelling unit's fixtures. Fixture stopcocks or shut-off valves located immediately adjacent to a fixture may not be adequate to protect the water distribution piping. Where a residential suite is served by a single shut-off valve on the water supply, additional shut-off valves may be required to achieve compliance with Sentences 7.6.1.5.(1) and 7.6.1.8.(1).

A-7.6.1.10. Check Valves.

When a check valve is required by Sentence 7.6.1.10.(1), or a backflow preventer by Article 7.6.2.2., or a pressure reducing valve by Article 7.6.3.3., protection against thermal expansion may be required.

A-7.6.1.12.(6) Relief Valves.

A relief valve shall not be routed through or discharge to an area where freezing temperatures may occur.

If the discharge piping is longer than 2 m or more than two 90° elbows are used, the valve manufacturer's installation instructions should be followed to ensure that the piping does not affect the relief valve's discharge capacity.

A-7.6.1.14.(1) Water Hammer Prevention.

Water hammer is a build-up of pressure in a length of horizontal or vertical ipe which occurs when a valve or faucet is closed suddenly. The longer the pipe and the greater the water velocity the greater is the pressure exerted on the pipe, which can be many times the normal static water pressure and be sufficient to burst the pipe. Ordinary kitchen and bathroom faucets can be closed quickly enough to cause water hammer even with relatively low water pressure in the pipe.

Means of preventing water hammer should be installed wherever there are valves or faucets, particularly where they are at the end of long lengths of pipes. This may be done by installing either water hammer arresters which are manufactured for the purpose or air chambers installed vertically that are fabricated from pieces of piping with a closed upper end and connected to the end of the horizontal or vertical run of pipe.

The air chamber should be 300 to 450 mm long if made from the same size pipe as the water pipe it serves. If the chamber is made from a pipe with larger diameter than the water pipe, its length can be reduced accordingly

Air chambers should be accessible if they are the manufactured type with top air valve and a stop-and-waste valve or are of the diaphragm type.

A-7.6.1.16.(1) Thermal Expansion.

To accommodate the increase in pressure caused by thermal expansion within a closed water system, one of the following should be installed:

(a) a suitably sized diaphragm expansion tank designed for use within a potable water system,
(b) an auxiliary thermal expansion relief valve (T.E.R. valve) conforming to CAN/CSA-B125, "Plumbing Fittings", set to a pressure of 550 kPa or less and designed for repeated use, or
(c) other means acceptable to the authority having jurisdiction.

e1 A-7.6.2.8. Flushing and Disinfecting Water Service Pipes.

Water service pipes of 100 mm in size or larger shall be flushed and disinfected. Flushed sections shall be protected from contamination.

After flushing is completed, water from the existing distribution system shall be allowed to flow at a controlled rate into the new piping. Liquid chlorine solution shall be introduced so that the chlorine is distributed throughout the section being disinfected. The chlorine shall be applied so that the chlorine concentration is 50 mg/L minimum throughout the section. Then the system shall be left charged with 50 mg/L chlorine solution for 24 hours.

Test the chlorine residual piping after 24 hours. If tests indicate a chlorine residual of at least 25 mg/L, the section shall be flushed completely and recharged with water normal to the operation of the system. If the test does not meet the requirements, the chlorination procedure shall be repeated until satisfactory results are obtained. After the system has been recharged, take samples for bacteriological tests. If there is indication of contamination, the disinfection procedure shall be repeated. The system shall not be put into operation until clearance has been given by the inspector appointed by the chief building official.

A-7.6.2.4.(9) Locations Requiring Premise Isolation.

The following list is a guide to locations where premise isolation may be required:
- hospital buildings with operating, mortuary or laboratory facilities
- radioactive material processing plants
- petrochemical processing facilities
- premises where inspection is restricted
- sewage treatment plants
- commercial laundries (excluding laundromats)
- plating or chemical plants
- docks and dockside facilities
- food and beverage processing plants
- steam plants
- trackside facilities for trains

An assessment of the hazard must be carried out to determine the need, if any, for a backflow prevention device.

A-8.1.3.1.(1) Sanitary Sewage.

Sanitary sewage of domestic origin is as described in (b) of the definition in Sentence 1.4.1.2.(1) of Division A.

A-8.1.3.1.(3) Evaluation of Waste from Industrial Processes.

When evaluating whether industrial process waste can go to an on-site sewage system, the total contaminant levels in the whole waste stream must be looked at. Heavy metals, pesticides and solvents are not found in domestic sewage and those levels must be brought down if present. The BOD_5 and suspended solids should be consistent with the levels found in domestic sanitary sewage. Slaughterhouses and milking operations have wastes that are similar to domestic sewage in chemical composition, but are characterized by high organic, highly nitrogenous and biologically degradable suspended and dissolved solids and grease in high concentrations. These wastes are not suitable for discharge to an on-site sewage system.

a1 A-8.2.1.2.(1) Site Evaluation Information.

The evaluation required in Sentence (1) usually includes at least the following and is required on permit application
- (a) date the evaluation was done,
- (b) name, address, telephone number, and signature of the person who prepared the evaluation,
- (c) a scaled plan of the site showing
  - (i) the legal description of the property, property lines and easements,
  - (ii) the location of items in Column 1 of Tables 8.2.1.6.A. and 8.2.1.6.B.,
  - (iii) the proposed location of the sewage system,
  - (iv) the location of any unsuitable, disturbed or compacted areas, and
  - (v) the access route for tank maintenance.

(d) depth to bedrock,
(e) evidence of high ground water,
(f) soil properties,
(g) soil conditions,
(h) utility corridors,
(i) permeability, and
(j) potential for flooding.

A-8.2.1.2.(2) Alternative Tests.

Other tests to determine percolation time may be suitable depending on the soil type(s) encountered on a site. The results of tests other than those described in this Code may be used by relying on provisions governing the use of alternative solutions (such as Clause 1.2.1.1.(1)(b) of Division A and formerly Section 2.7. in the 1997 edition of the Building Code).

A-8.2.1.2.(3) Test Procedure.

Where a field percolation test is required, it is performed in the following manner:

(a) Make an excavation in the soil layer which is to be assessed for a percolation time. The excavation shall be:
    (i) between 100 and 300 mm in diameter
    (ii) be at least 200 mm in depth below the upper level of the soil layer being assessed.
(b) All loose material and smeared clay shall be removed from the sides and bottom of the excavation.
(c) Cover the bottom of the excavation with 50 mm of sand or fine gravel.
(d) Fill the hole with water to a depth of 300 mm (or to the surface) and determine the time it takes for the water to seep away; repeat, and if the second filling seeps away in 10 minutes or less proceed as follows:
    1. Establish a fixed reference point, add water to a depth of 150 mm above the sand or fine gravel, and measure the water drop every 10 minutes for one hour. If for one hour the first 150 mm seeps away in 10 minutes or less, use a shorter time interval between readings.
    2. Refill to the 150 mm level when necessary and start another series of readings. Continue readings until the last two series of readings show a similar drop pattern (approximately equal drop in the same number of readings) or, alternatively, until the difference in the maximum and minimum drops in 3 consecutive readings is less than 5 mm. In either case use the average drop of the last 3 readings in computing "T"
(e) If the initial fillings to 300 mm take more than 10 minutes to seep away, follow with this procedure:
    1. Maintain at least 300 mm of water in the hole for at least 4 hours, or until the soil being tested has become swollen and saturated with water. At least 12 hours should be allowed for swelling in clay soils, although dry clay soils may require longer periods to obtain a stabilized percolation rate.
    2. After swelling remove any loose material from the top of the sand or fine gravel.
    3. Using a fixed reference point, adjust the water level to 150 mm above the sand or gravel and measure the water drop every 30 minutes for four hours or until a stable rate of drop is reached. If the first 150 mm seeps away in less than 30 minutes, use a 10 minute interval and run the test for one hour or until the drop rate is stabilized. A drop of 5 mm or less in a 30 minute interval is indicative of a soil of "T" close to or greater than 50 min/cm. If it is to be assessed increase the reading interval to 60 minutes.
    4. Refill with water to the 150 mm level when necessary. Take readings until a stable rate of drop is reached. This may be when the drop in two successive readings does not vary by more than 1.5 mm or when the difference between the maximum and minimum readings of the last four readings does not exceed 5 mm. Once a stable rate is reached use the average drop of the last 3 readings in computing the percolation time.
(f)

$$\text{Percolation time} = \frac{\text{Time Interval (minutes)}}{\text{Average drop of last 3 readings (cm)}}$$

a1 A-8.2.1.3.(1) and (2) Balancing Tanks.

Where variable daily flows or peak flows occur, the flows to the sewage system may be balanced. The *sewage system* and any pump(s) that are installed to move the sanitary sewage, should be sized to accommodate a daily design *sanitary sewage* flow at least equal to the average daily sanitary sewage flow for the week. Balancing tanks should be sized in accordance with good engineering practice to ensure that peak flows can be accommodated.

a1 A-8.2.1.4. Clearance Requirements.

Where coarse natural soils exist it may be necessary to require greater clearance distances to wells or surface water than those listed in the Tables. This is of greater importance when applied to the shoreline properties of sensitive lakes, where it is desired to prevent phosphates from entering the lakes.

a1 A-8.7.4.2.(1) Fill Material.

Any leaching bed fill added to meet the requirements of 8.7.4.2.(1) shall be regarded as part of the sewage system and this fill must be contained on the lot or parcel of land in which the sewage system is located.

a1 A-8.7.5.3.(2) Spacing of Distribution Pipes.

In order to evenly apply the effluent when a filter bed is used, the maximum spacing of distribution pipes should not be greater than 1.2 m.

A-8.7.6.2. Trench Construction.

Care must be taken when constructing a shallow buried trench system. Soils have to be dry and protected to ensure smearing of the trench does not take place. If smearing does take place additional measure will need to be undertaken to ensure that the permeability of the soil is not affected in the trench.

A-9.1.1.9. Factory-Built Buildings.

Manufactured buildings intended for residential occupancy must comply with all appropriate Code requirements. Only those building components that are designed and constructed in manufacturing plants in accordance with the specified standards (CSA Z240.2.1, CSA Z240.8.1 and CSA A-277) are deemed to comply with the Code. Building components designed and constructed outside the place of manufacture (e.g. masonry chimneys, basement stairs, foundations, etc.) must conform to the requirements of the Code. The Code also applies to the site installation of manufactured buildings in terms of tie-down, spatial separation, grading, plumbing connections to street services, etc.

CSA standard CAN/CSA-A277, "Procedure for Certification of Factory-Built Houses", describes a procedure whereby an independent certification agency can review the quality control procedures of a housing factory and make periodic, unannounced inspections of its products and thus, through suitable labelling, provide assurance to authorities at the final site that the components that cannot be inspected on site comply with the code indicated on the label. It is not a building code, only a procedure for certifying compliance of factory-built components with a building code or other standard. If a factory-built house bears the label of a creditable certification agency indicating that compliance with the National Building Code has been certified using the A277 procedure, the accepting authority will have some assurance that the hidden components do not need to be inspected again on site.

A-Table 9.3.2.1. Lumber Grading.

To identify board grades the paragraph number of the NLGA rules under which the lumber is graded must be shown in the grade mark. Paragraph 113 is equivalent to WWPA rules and paragraph 114 is equivalent to WCLIB rules. When graded in accordance with WWPA or WCLIB rules, the grade mark will not contain a paragraph number.

A-9.3.2.1.(1) Grade Marking of Lumber.

Lumber is generally grouped for marketing into the species combinations contained in Table A-9.3.2.1.A. The maximum allowable spans for those combinations are listed in the span tables for joists, rafters and beams. Some species of lumber are also marketed individually. Since the allowable span for the northern species combination is based on the weakest species in the combination, the use of the span for this combination is permitted for any individual species not included in the Spruce-Pine-Fir, Douglas Fir-Larch and Hemlock-Fir combinations.

Facsimiles of typical grade marks of lumber associations and grading agencies accredited by the Canadian Lumber Standards (CLS) Accreditation Board to grade mark lumber in Canada are shown in Table A-9.3.2.1.B. Accreditation by the CLS Accreditation Board applies to the inspection, grading and grade marking of lumber, including mill supervisory service, in accordance with CAN/CSA-O141, "Softwood Lumber". The grade mark of a CLS accredited agency on a piece of lumber indicates its assigned grade, species or species combination, moisture condition at the time of surfacing, the responsible grader or mill of origin and the CLS accredited agency under whose supervision the grading and marking was done.

Table A-9.3.2.1.A.
Species Designations and Abbreviations

Commercial Designation of Species or Species Combination	Abbreviation Permitted on Grade Stamps	Species Included
Douglas Fir - Larch	D Fir - L (N)	Douglas Fir, Western Larch
Hemlock - Fir	Hem - Fir (N)	Western Hemlock, Amabilis Fir
Spruce - Pine - Fir	S-P-F or Spruce - Pine - Fir	White Spruce, Engelmann Spruce, Black Spruce, Red Spruce, Lodgepole Pine, Jack Pine, Alpine Fir, Balsam Fir
Northern Species	North Species	Any Canadian softwood covered by the NLGA Standard Grading Rules

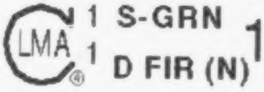
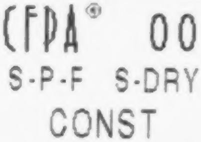
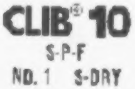
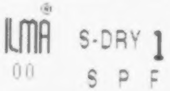
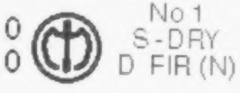
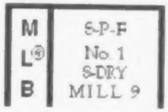
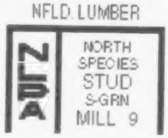
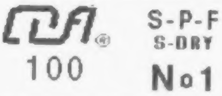
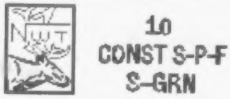
Canadian lumber is graded to the NLGA Standard Grading Rules for Canadian Lumber, published by the National Lumber Grades Authority. The NLGA rules specify standard grade names and grade name abbreviations for use in grade marks to provide positive identification of lumber grades. In a similar fashion, standard species names or standard species abbreviations, symbols or marks are provided in the rules for use in grade marks.

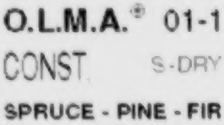
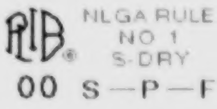
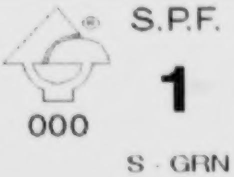
Grade marks denote the moisture content of lumber at the time of surfacing. "S-Dry" in the mark indicates the lumber was surfaced at a moisture content not exceeding 19%. "MC 15" indicates a moisture content not exceeding 15%. "S-GRN" in the grade mark signifies that the lumber was surfaced at a moisture content higher than 19% at a size to allow for natural shrinkage during seasoning.

Each mill or grader is assigned a permanent number. The point of origin of lumber is identified in the grade mark by use of a mill or grader number or by the mill name or abbreviation. The CLS certified agency under whose supervision the lumber was grade marked is identified in the mark by the registered symbol of the agency.

Table A-9.3.2.1.B.
Facsimiles of Grade Marks Used by Canadian Lumber Manufacturing Associations and Agencies Authorized to Grade Mark Lumber in Canada

Facsimiles of Grade Mark	Association or Agency
A.F.P.A.® 00 S-P-F S-DRY STAND	Alberta Forest Products Association200-11738 Kingsway AvenueEdmonton, Alberta T5G 0X5
C L® A 100 SPRUCE PINE FIR NO.1 S-DRY	Canadian Lumbermen's Association 27 Goulburn Avenue Ottawa, Ontario K1N 8C7
COFI® No 1 S-DRY 100 HEM-FIR (N)	Canadian Mill Services Association 1200-555 Burrard Street Vancouver, British Columbia V7X 1S7

Facsimiles of Grade Mark	Association or Agency
 CLMA 1 S-GRN 1 1 D FIR (N)	Cariboo Lumber Manufacturers' Association 205-197 North 2nd Avenue Williams Lake, British Columbia V2G 1Z5
 CFPA 00 S-P-F S-DRY CONST	Central Forest Products Association Inc. P.O. Box 1169 Hudson Bay, Saskatchewan S0E 0Y0 Coniferous
 CLIB 10 S-P-F NO. 1 S-DRY	Lumber Inspection Bureau 6-383 John Street North Arnprior, Ontario K7S 2P8
 ILMA S-DRY 1 00 S P F	Interior Lumber Manufacturers' Association 360-1855 Kirschner Road Kelowna, British Columbia V1Y 4N7
 0 0 No 1 S-DRY D FIR (N)	MacDonald Inspection Division of Warnock Hersey Professional Services 211 Schoolhouse Street Coquitlam, British Columbia V3K 4X9
 M L B S-P-F No. 1 S-DRY MILL 9	Maritime Lumber Bureau P.O. Box 459 Amherst, Nova Scotia B4H 4A1
 NFLD. LUMBER NLPA NORTH SPECIES STUD S-GRN MILL 9	Newfoundland Lumber Producers Association P.O. Box 8 Glovertown, Newfoundland A0G 2L0
 NFPA 100 S-P-F S-DRY No1	Northern Forest Products Association 400-1488 Fourth Avenue Prince George, British Columbia V2L 4Y2
 NWT 10 CONST S-P-F S-GRN	N.W.T. Forest Industries Association Box 1033 Hay River, Northwest Territories X0E 0R0

Facsimiles of Grade Mark	Association or Agency
 O.L.M.A.® 01-1 CONST S-DRY SPRUCE - PINE - FIR	Ontario Lumber Manufacturers' Association 55 University Avenue, Suite 1105, Box 8 Toronto, Ontario M5J 2H7
 NLGA RULE NO 1 S-DRY 00 S—P—F	Pacific Lumber Inspection Bureau P.O. Box 7235 Bellevue, Washington 98008-1235 USA British Columbia Division: P.O. Box 19118 Fourth Avenue Postal Outlet Vancouver, British Columbia V6C 4R8
 S.P.F. 1 000 S - GRN	Quebec Lumber Manufacturers' Association Association des manufacturiers de bois de sciage du Québec 5055, boul. Hamel ouest, bureau 200 Québec (Québec) G2E 2G6

A-9.3.2.8.(1) Non-Standard Lumber.

The NLGA "Standard Grading Rules for Canadian Lumber" permit lumber to be dressed to sizes below the standard sizes (38 x 89 (2" x 4"), 38 x 140 (2" x 8"), 38 x 184 (2" x 10", etc.) provided the grade stamp shows the reduced size. This Sentence permits the use of the span tables for such lumber, provided the size indicated on the stamp is not less than 95% of the corresponding standard size. Allowable spans in the tables must be reduced a full 5% even if the undersize is less than the 5% permitted.

A.9.3.2.9.(3) Protection of Structural Wood Elements from Moisture and Decay.

There are many above-ground, structural wood systems where precipitation is readily trapped or drying is slow, creating conditions conducive to decay. Some examples are:

- beams extending beyond roof decks
- junctions between deck members
- connections between balcony guards and walls

A-9.3.2.9.(4) Protection of Retaining Walls and Cribbing from Decay.

Retaining walls supporting soil are considered to be structural elements of the building if a line drawn from the outer edge of the footing to the bottom of the exposed face of the retaining wall is greater than 45° to the horizontal. Retaining walls supporting soil may be structural elements of the building if the line described above has a lower slope.

e_1 Retaining walls that are not critical to the support of building foundations but are greater than 1.2 m in height may pose a danger of sudden collapse to persons adjacent to the wall if the wood is not adequately protected from decay. The height of the retaining wall or cribbing is measured as the vertical difference between the ground levels on each side of the wall.

A-9.4.1.1. Structural Design.

Article 9.4.1.1. establishes the principle that the structural members of Part 9 buildings must

- comply with the prescriptive requirements provided in Part 9,
- be designed in accordance with accepted good practice, or
- be designed in accordance with Part 4 using the loads and limits on deflection and vibration specified in Part 9 or Part 4.

Usually a combination of approaches is used. For example, even if the snow load calculation on a wood roof truss is based on Subsections 9.4.2., the joints must be designed in accordance with Part 4. Wall framing may comply with the prescriptive requirements in Subsections 9.23.3., 9.23.10., 9.23.11. and 9.23.12., while the floor framing may be engineered.

Design according to Part 4 or accepted good engineering practice, such as that described in the "Engineering Guide for Wood Frame Construction" (CWC Guide), published by the Canadian Wood Council, requires engineering expertise. The CWC Guide contains alternative solutions and provides information on the applicability of the Part 9 prescriptive structural requirements to further assist designers and building officials to identify the appropriate design approach. The need for professional involvement in the structural design of a building, whether to Part 4 or Part 9 requirements or accepted good practice, is defined by provincial legislation and is reflected in Section 1.2 of Division C.

A-9.4.1.1.(3) Structural Design for Lateral Wind and Earthquake Loads.

The only explicit treatment of structural loads in Section 9.4. is for gravity loads; wind and earthquake loads are dealt with implicitly in the body of Part 9 and are not used as inputs to any of the span tables. There may therefore be a tendency to assume that wind and earthquake loads do not need to be considered in the design of Part 9 buildings. In most cases this is true: the majority of low rise, wood frame buildings have a great deal of structural redundancy and continuity and have more than enough capacity to resist lateral loads due to wind and earthquake.

For example, in a traditional house configuration, even if there are large openings in the exterior walls for picture windows and sliding doors, the many interior partitions act as shear walls and provide adequate lateral stability. This may not be the case for some newer house designs.

However, this does not apply to all building configurations or details that might be found in Part 9 buildings. For example, a mercantile building might be long and narrow with almost entirely windowed walls on the ends and few structurally attached interior partitions. In such a case, wind and earthquake loads would have to be considered in the design of the long structural walls and their foundations.

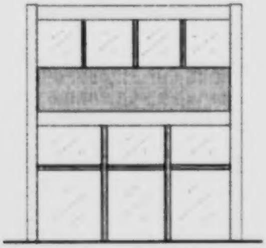


Figure A-9.4.1.1.(3).A
Mercantile Building with Little Resistance to Lateral Loading

Many buildings have been constructed with the lowest level exterior walls as short, wood-frame knee- or pony-walls. In the past, these were often constructed with no lateral bracing and with no interior partitions. The only structural continuity in the foundation-to-knee-wall and knee-wall- to-floor joints comes from nailing and this is inadequate to resist lateral loads from significant earthquakes. See Figure A-9.4.1.1.(3).B. These walls must be braced or sheathed to resist lateral loads from earthquakes. In higher load regions, they should be sheathed. In all regions, storeys with knee-walls should be considered as storeys for the purpose of determining building height and the application of the Part 9 structural requirements.

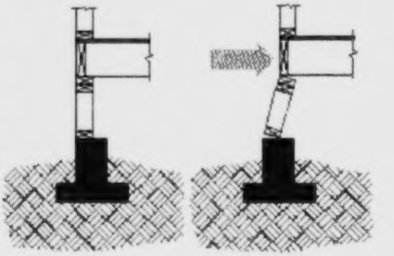


Figure A-9.4.1.1.(3).B
Crawl Space Knee-wall with Little Resistance to Lateral Loading

Thus, Part 9 buildings are not exempt from having to comply with the wind and earthquake loading requirements of Part 4. In many cases, these considerations can safely be ignored but, in certain configurations, the building's resistance to wind and earthquake loads must be carefully considered. See also A-9.23.10.2.

In cases where lateral load design is required, the "Engineering Guide for Wood Frame Construction" (CWC Guide) provides acceptable engineering solutions as an alternative to Part 4. The CWC Guide also contains alternative solutions and provides information on the applicability of the Part 9 prescriptive structural requirements to further assist designers and building officials to identify the appropriate design approach.

A-9.4.2.1.(1) Application of Simplified Part 9 Snow Loads

The simplified specified snow loads described in Article 9.4.2.2. may be used where the structure is of the configuration that is typical of traditional wood-frame residential construction and its performance. This places limits on the spacing of joists, rafters and trusses, the spans of these members and supporting members, deflection under load, overall dimensions of the roof and the configuration of the roof. It assumes considerable redundancy in the structure.

Because very large buildings may be constructed under Part 9 by constructing firewalls to break up the building area, it is possible to have Part 9 buildings with very large roofs. The simplified specified snow loads may not be used when the total roof area of the overall structure exceeds 4 550 m^2. Thus, the simplified specified snow load calculation may be used for typical townhouse construction but would not be appropriate for much larger commercial or industrial buildings, for example.

The simplified specified snow loads are also not designed to take into account roof configurations that seriously exacerbate snow accumulation. This does not pertain to typical projections above a sloped roof, such as dormers, nor does it pertain to buildings with higher and lower roofs. Although two-level roofs generally lead to drift loading, smaller light-frame buildings constructed according to Part 9 have not failed under these loads. Consequently, the simplified calculation may be used in these cases. Rather, this limitation on application of the simplified calculation pertains to roofs with high parapets or significant other projections above the roof, such as elevator penthouses, mechanical rooms or larger equipment that would effectively collect snow and preclude its blowing off the roof.

The reference to Article 9.4.3.1. invokes, for roof assemblies other than common lumber trusses, the same performance criteria for deflection.

The unit weight of snow on roofs, γ, obtained from measurements at a number of weather stations across Canada varied from about 1.0 to 4.5 kN/m^3. An average value for use in design in lieu of better local data is γ = 3.0 kN/m^3. In some locations the unit weight of snow may be considerably greater than 3.0 kN/m^3. Such locations include regions where the maximum snow load on the roof is reached only after contributions from many snowstorms, coastal regions, and regions where winter rains are considerable and where a unit weight as high as 4.0 kN/m may be appropriate.

A-9.4.2.3.(1) Accessible Platforms Subject to Snow and Occupancy Loads.

Many platforms are subject to both occupancy loads and snow loads. These include balconies, decks, verandas, flat roofs over garages and carports. Where such a platform, or a segregated area of such a platform, serves a single dwelling unit, it must be designed for the greater of either the specified snow load or an occupancy load of 1.9 kPa. Where the platform serves more than one single dwelling unit or an occupancy other than a residential occupancy, higher occupancy loads will apply, as specified in Table 4.1.5.3.

A-9.4.2.4.(1) Specified Loads for Attics or Roof Spaces with Limited Accessibility.

Typical residential roofs are framed with roof trusses and the ceiling is insulated. Residential trusses are placed at 600 mm on centre with web members joining top and bottom chords. Lateral web bracing is installed perpendicular to the span of the trusses. As a result, there is limited room for movement inside the attic or roof space or for storage of material. Access hatches are generally built to the minimum acceptable dimensions, further limiting the size of material that can be moved into the attic or roof space. With exposed insulation in the attic or roof space, access is not recommended unless protective clothing and breathing apparatus are worn.

Thus, the attic or roof space is recognized as uninhabitable and loading can be based on actual dead load. In emergency situations or for the purpose of inspection, it is possible for a person to access the attic or roof space without over-stressing the truss or causing damaging deflections.

A-Table 9.4.4.1. Classification of Soils.

Sand or gravel may be classified by means of a picket test in which a 38 mm by 38 mm (2 in X 2 in) picket bevelled at the end at 45° to a point is pushed into the soil. Such material is classified as "dense or compact" if a man of average weight cannot push the picket more than 200 mm into the soil and "loose" if the picket penetrates 200 mm or more.

Clay and silt may be classified as "stiff" if it is difficult to indent by thumb pressure, "firm" if it can be indented by moderate thumb pressure, "soft" if it can be easily penetrated by thumb pressure, where this test is carried out on undisturbed soil in the wall of a test pit.

A-9.4.4.4.(1) Soil Movement.

In susceptible soils, changes in temperature or moisture content can cause significant expansion and contraction. Soils containing pyrites can expand simply on exposure to air.

Expansion and Contraction due to Moisture

Clay soils are most prone to expansion and contraction due to moisture. Particularly wet seasons can sufficiently increase the volume of the soil under and around the structure to cause heaving of foundations and floors-on-ground, or cracking of foundation walls. Particularly dry seasons or draw-down of water by fast-growing trees can decrease the volume of the soil supporting foundations and floors-on-ground, thus causing settling.

Frost Heave

Frost heave is probably the most commonly recognized phenomenon related to freezing soil. Frost heave results when moisture in frost-susceptible soil (clay and silt) under the footings freezes and expands. This mechanism is addressed by requirements in Section 9.12. regarding the depth of excavations.

Ice Lenses

When moisture in frost-susceptible soils freezes, it forms an ice lens and reduces the vapour pressure in the soil in the area immediately around the lens. Moisture in the ground redistributes to rebalance the vapour pressures providing more moisture in the area of the ice lens. This moisture freezes to the lens and the cycle repeats itself. As the ice lens grows, it exerts pressure in the direction of heat flow. When lenses form close to foundations and heat flow is toward the foundation - as may be the case with unheated crawl spaces or open concrete block foundations insulated on the interior-the forces may be sufficient to crack the foundation.

Adfreezing

Ice lenses can adhere themselves to cold foundations. Where heat flow is essentially upward, parallel to the foundation, the pressures exerted will tend to lift the foundation. This may cause differential movement or cracking of the foundation. Heat loss through basement foundations of cast-in-place concrete or concrete block insulated on the exterior appears to be sufficient to prevent adfreezing. Care must be taken where the foundation does not enclose heated space or where open block foundations are insulated on the interior. The installation of semi-rigid glass fibre insulation has demonstrated some effectiveness as a separation layer to absorb the adfreezing forces.

Pyrites

Pyrite is the most common iron disulphide mineral in rock and has been identified in rock of all types and ages. It is most commonly found in metamorphic and sedimentary rock, and especially in coal and shale deposits.

Weathering of pyritic shale is a chemical-microbiological oxidation process that results in volume increases that can heave foundations and floors-on-ground. Concentrations of as little as 0.1 % by weight have caused heaving. Weathering can be initiated simply by exposing the pyritic material to air. Thus, building on soils that contain pyrites in concentrations that will cause damage to the building should be avoided, or measures should be taken to remove the material or seal it. Material containing pyrites should not be used for backfill at foundations or for supporting foundations or floors-on-ground.

Where it is not known if the soil or backfill contains pyritic material in a deleterious concentration, a test is available to identify its presence and concentration.

References:

(1) Legget, R.F. and Crawford, C.B. Trees and Buildings. Canadian Building Digest 62, Division of Building Research, National Research Council Canada, Ottawa, 1965.

(2) Hamilton, J.J. Swelling and Shrinking Subsoils. Canadian Building Digest 84, Division of Building Research, National Research Council Canada, Ottawa, 1966.

(3) Hamilton, J.J. Foundations on Swelling and Shrinking Subsoils. Canadian Building Digest 184, Division of Building Research, National Research Council Canada, Ottawa, 1977.

(4) Penner, W., Eden, W.J., and Gratten-Bellew, P.E. Expansion of Pyritic Shales. Canadian Building Digest 152, Division of Building Research, National Research Council Canada, Ottawa, 1975.

(5) Swinton, M.C., Brown, W.C., and Chown, G.A. Controlling the Transfer of Heat, Air and Moisture through the Building Envelope. Small Buildings - Technology in Transition, Building Science Insight '90, Institute for Research in Construction, National Research Council Canada, Ottawa, 1990.

A-9.4.4.6. and 9.15.1.1. Loads on Foundations.

The prescriptive solutions provided in Part 9 relating to footings and foundation walls only account for the loads imposed by drained earth. Drained earth is assumed to exert a load equivalent to the load that would be exerted by a fluid with a density of 480 kg/m^3. The prescriptive solutions do not account for surcharges from saturated soil or additional loads from heavy objects located adjacent to the building. Where such surcharges are expected, the footings and foundation walls must be designed and constructed according to Part 4.

A-9.5.1.4. Combination Rooms.

If a room draws natural light and natural ventilation from another area, the opening between the two areas must be large enough to effectively provide sufficient light and air. This is why a minimum opening of 3 m^2 is required, or the equivalent of the area of a set of double doors. The effectiveness of the transfer of light and air also depends on the size of the transfer opening in relation to the size of the dependent room; in measuring the area of the wall separating the two areas, the whole wall on the side of the dependent room should be considered, not taking into account offsets that may be in the surface of the wall.

The opening does not necessarily have to be in the form of a doorway; it may be an opening at eye level. However, if the dependent area is a bedroom, provision must be made for the escape window required by Article 9.7.1.3. to fulfill its safety function. This is why a direct passage is required between the bedroom and the other area; the equivalent of at least a doorway is therefore required for direct passage between the two areas.

a1 A-9.5.2.3.(1) Stud Wall Reinforcement.

This provision for future attachment of grab bars in the main bathroom of a residential occupancy including houses requires the installation of suitable blocking in the stud wall. Sentence 9.31.2.3.(1) specifies the required load resistance.

A-Table 9.6.6.1. Glass in Doors.

Maximum areas in Table 9.6.6.1. for other than fully tempered glazing are cut off at 1.50 m², as this would be the practical limit after which safety glass would be required by Sentence 9.6.6.2.(3).

A-9.6.6.3.(1) Mirrored Glass Doors.

Standard CAN/CGSB-82.6 covers mirrored glass doors for use on reach-in closets. It specifies that such doors are not to be used for walk-in closets.

A-9.6.8.1. Forced Entry Via Glazing in Doors and Sidelights.

There is no mandatory requirement that special glass be used in doors or sidelights, primarily because of cost. It is, however, a common method of forced entry to break glass in doors and sidelights to gain access to door hardware and unlock the door from the inside. Although insulated glass provides increased resistance over single glazing, the highest resistance is provided by laminated glass. Tempered glass, while stronger against static loads, is prone to shattering under high, concentrated impact loads.

Laminated glass is more expensive than annealed glass and must be used in greater thicknesses. Figure A-9.6.8.1. shows an insulated sidelight made of one pane of laminated glass and one pane of annealed glass. This method reduces the cost premium that would result if both panes were laminated.

Consideration should be given to using laminated glazing in doors and accompanying sidelights regulated by Article 9.6.6.1., in windows located within 900 mm of locks in such doors, and in basement windows.

Underwriters' Laboratories of Canada have produced a document ULC Subject C972-1974, "Guide for the Investigation of Burglary Resisting Glazing Material", which provides a test procedure to evaluate the resistance of glazing to attacks by thieves. While it is principally intended for plate glass show windows, it may be of value for residential purposes.

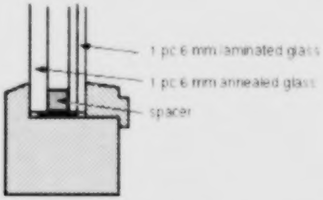


Figure A-9.6.8.1.
Combined laminated/annealed glazing

A-9.6.8.5.(1) Door Fasteners.

The purpose of the requirement for 30 mm screw penetration into solid wood is to prevent the door from being dislodged from the jamb due to impact forces. It is not the intent to prohibit other types of hinges or strikeplates that are specially designed to provide equal or greater protection.

A-9.6.8.7.(1) Hinged Doors.

Methods of satisfying this Sentence include either using non-removable pin hinges or modifying standard hinges by screw fastening a metal pin in a screw hole in one half of the top and bottom hinges. When the door is closed, the projecting portion of the pin engages in the corresponding screw hole in the other half of the hinge and then, even if the hinge pin is taken out, the door cannot be removed.

A-9.6.8.10.(1) Resistance of Doors to Forced Entry.

This Sentence designates standard ASTM F 476, "Test Methods for Security of Swinging Door Assemblies" as an alternate to compliance with the prescriptive requirements for doors and hardware. The annex to the standard provides four security classifications, with acceptance criteria, depending on the type of building and the crime rate of the area in which it is located. The Building Code has only specified Grade 10, the minimum level. The annex suggests the following guidelines be followed when selecting security levels for door assemblies:

Grade 10:	This is the minimum security level and is quite adequate for single-family residential buildings located in stable, low-crime areas.
Grade 20:	This is the low-medium security level and is designed to provide security for residential buildings located in average crime-rate areas and for apartments in both low and average crime-rate areas.
Grade 30:	This is the medium-high security level and is designed to provide security for residential buildings located in higher than average crime-rate areas or for small commercial buildings in average or low crime-rate areas.
Grade 40:	This is the high security level and is designed for small commercial buildings located in high crime-rate areas. This level could also be used for residential buildings having an exceptionally high incidence of semi-skilled burglary attacks.

All these grades satisfy the Code and can be considered for use where a higher level of security is desired or warranted.

A-9.7.1.3.(1) Bedroom Window Height.

Sentence 9.7.1.3.(1) requires every floor level which contains a bedroom to have at least one window or door to the exterior that is large enough and easy enough to open that it can be used as an exit in case of a fire. However, Article 9.7.1.3. does not set a maximum sill height for such a window in a basement area. It is recommended that the sills of windows intended for use as emergency exits from basement bedroom areas be not higher than 1.5 m above the floor. Sometimes it is difficult to avoid having the sill higher than this; e.g., skylights, windows in basement bedrooms. In these cases, it is recommended that access to the window be improved by some means such as built-in furniture installed below the window.

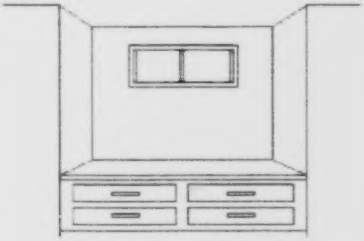
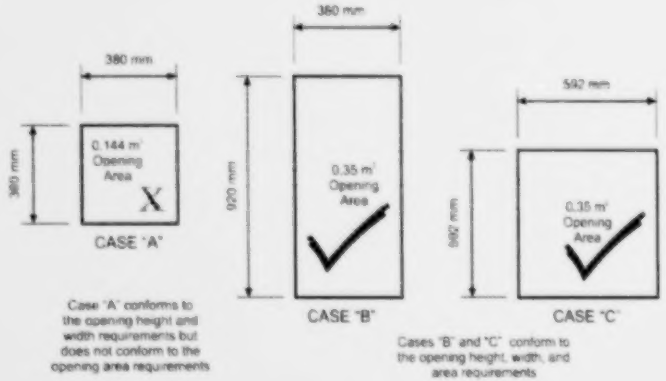


Figure A-9.7.1.3.A.
Built-in Furniture to Improve Access to a Window

A-9.7.1.3.(2) Bedroom Window Opening Areas and Dimensions.

Although the minimum opening dimensions required for height and width are 380 mm, a window opening that is 380 mm by 380 mm would not comply with the minimum area requirements. (See Figure A-9.7.1.3.B.)



Case "A" conforms to the opening height and width requirements but does not conform to the opening area requirements

Cases "B" and "C" conform to the opening height, width, and area requirements

Figure A-9.7.1.3.B.
Window Opening Areas and Dimensions

A-9.7.1.6. Height of Window Sills above Floors or Ground.

The primary intent of the requirement is to minimize the likelihood of small children falling significant heights from open windows. Reflecting reported cases, the requirement applies only to dwelling units and generally those located on the second floor or higher of residential or mixed use buildings where the windows are essentially free-swinging or free-sliding.

Free-swinging or free-sliding means that a window that has been cracked open can be opened further by simply pushing on the openable part of the window. Care must be taken in selecting windows, as some with special operating hardware can still be opened further by simply pushing on the window.

Casement windows with crank operators would be considered to conform to Clause (1)(b). To provide additional safety, where slightly older children are involved, occupants can easily remove the crank handles from these windows. Awning windows with scissor hardware, however, may not keep the window from swinging open once it is unlatched. Hopper windows would be affected only if an opening is created at the bottom as well as at the top of the window. The requirement will impact primarily on the use of sliding windows which do not incorporate devices in their construction that can be used to limit the openable area of the window.

The 100 mm opening limit is consistent with widths of openings that small children can fall through. It is only invoked, however, where the other dimension of the opening is more than 380 mm. Again, care must be taken in selecting a window. At some position, scissor hardware on an awning window may break up the open area such that there is no unobstructed opening with dimensions greater than 380 mm and 100 mm. At another position, however, though the window is not open much more, the hardware may not adequately break up the opening. The 480 mm height off the floor recognizes that furniture is often placed under windows and small children are often good climbers.

A-9.7.2.1.(1) Window Standard.

CSA Standard CAN/CSA-A440-M, "Windows," includes a window classification system that rates the assembly according to airtightness, watertightness and wind load resistance. The ratings achieved by each window are marked on the window and indicate the level of performance that can be expected. Sentence 9.7.2.1.(1) references this standard and its companion document entitled CAN/CSA-A440.1, "User Selection Guide to CSA Standard CAN/CSA-A440-00, Windows," to assist specifiers, manufacturers and general users in identifying the window ratings appropriate for a particular building, based on its geographic location and height.

A-9.7.3.2.(1) Maximum Glass Area.

Tables A-9.7.3.2.A., A-9.7.3.2.B. and A-9.7.3.2.C. may be used to select glass thickness for windows subject to the following restrictions:

- The building has essentially uniform distribution of openings, i.e., no large opening, such as a loading door.
- The building height is 12 m (39 ft 4 in) or less from grade to the uppermost roof.
- The building is not in an exposed location such as a hilltop or the shore of a large body of water. These tables are based on Standard CAN/CGSB-12.20-M. In many cases, glass design based on these tables will be conservative due to conservative assumptions on which the tables are based. More exact design using the Standard directly could result in reduced glass thickness.

Table A-9.7.3.2.A.
Maximum Glass Area for Windows in Areas for which the 1-in-10 Wind Pressure (Q_{10}) is less than 0.40 kPa[1]

Type of Glass	Maximum Glass Area, m²							
	Glass Thickness, mm							
	2.5	3	4	5	6	8	10	12
Annealed	0.67	1.09	1.65	2.25	3.09	4.91	6.78	9.87
Factory-sealed IG units	1.20	1.96	2.97	4.05	5.56	8.04	10.06	13.96
Heat strengthened or tempered	1.47	2.08	2.73	3.34	4.13	5.69	7.12	9.87
Wired	0.31	0.49	0.76	1.04	1.44	2.26	3.13	5.00

Notes to Table A-9.7.3.2.A.:

(1) The maximum hourly wind pressure with one chance in ten of being exceeded in any one year.

Table A-9.7.3.2.B.
Maximum Glass Area for Windows in Areas for which the 1-in-10 Wind Pressure (Q_{10}) is less than 0.60 kPa[1]

Type of Glass	Maximum Glass Area, m²							
	Glass Thickness, mm							
	2.5	3	4	5	6	8	10	12
Annealed	0.42	0.66	1.02	1.40	1.93	3.05	4.20	6.65
Factory-sealed IG units	0.75	1.22	1.86	2.52	3.49	5.52	7.61	11.40
Heat strengthened	0.86	1.40	2.13	2.73	3.37	4.65	5.81	8.06
Tempered	1.20	1.70	2.24	2.73	3.37	4.65	5.81	9.06
Wired	0.20	0.32	0.50	0.68	0.95	1.50	2.06	3.32

Notes to Table A-9.7.3.2.B.:

(1) The maximum hourly wind pressure with one chance in ten of being exceeded in any one year.

Table A-9.7.3.2.C.
Maximum Glass Area for Windows in Areas for which the 1-in-10 Wind Pressure (Q_{10}) is less than 0.80 kPa[1]

Type of Glass	Maximum Glass Area, m²							
	Glass Thickness, mm							
	2.5	3	4	5	6	8	10	12
Annealed	0.30	0.50	0.76	1.05	1.45	2.32	3.21	5.11
Factory-sealed IG units	0.54	0.88	1.35	1.82	2.51	4.04	5.54	8.77
Heat strengthened	0.67	1.08	1.65	2.25	2.92	4.02	5.03	6.98
Tempered	1.04	1.47	1.93	2.37	2.92	4.02	5.03	9.06
Wired	0.14	0.24	0.37	0.51	0.70	1.14	1.57	2.53

Notes to Table A-9.7.3.2.C.:

(1) The maximum hourly wind pressure with one chance in ten of being exceeded in any one year, as provided in Supplementary Standard SB-1.

A-9.7.6.1.(1) Resistance of Windows to Forced Entry.

Although this Sentence only applies to windows within 2 m of adjacent ground level, certain house and site features, such as balconies or canopy roofs, allow for easy access to windows at higher elevations. Consideration should be given to specifying break-in resistant windows in such locations. This Sentence does not apply to windows that do not serve the interior of the dwelling unit, such as windows to garages, sun rooms or greenhouses, provided connections between these spaces and the dwelling unit are secure.

One method that is often used to improve the resistance of windows to forced entry is the installation of metal "security bars". However, while many such installations are effective in increasing resistance to forced entry, they may also reduce or eliminate the usefulness of the window as an exit in case of fire or other emergency that prevents use of the normal building exits. Indeed, unless such devices are easily openable from the inside, their installation in some cases would contravene the requirements of Article 9.7.1.3., which requires every bedroom that does not have an exterior door to have at least one window that is large enough and easy enough to open that it can be used as an exit in case of emergency. Thus an acceptable security bar system should be easy to open from the inside while still providing increased resistance to entry from the outside.

A-9.8.4. Step Dimensions.

The Code distinguishes three principal types of stair treads and uses the following terminology to describe them:

- rectangular treads are found in straight-run flights;
- angled treads are found in curved flights;
- winders are a special type of angled tread described in Appendix Note A-9.8.4.5.

See Figure A-9.8.4.

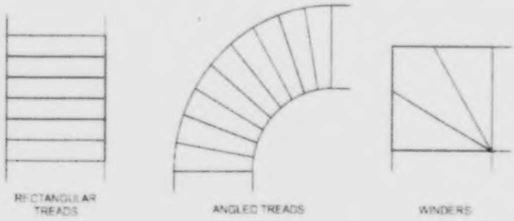


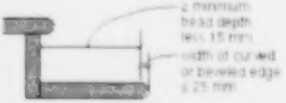
Figure A-9.8.4.
Types of Treads

A-9.8.4.5. Winders.

The safest method of incorporating a change in the direction of a stair is to use a landing. Within a dwelling unit, however, where occupants are familiar with their environment, winders are an acceptable method of reducing the amount of floor area devoted to the stair and have not been shown to be more hazardous than a straight run of steps. Nevertheless, care is required to ensure that winders are as safe as possible. Experience has shown that 30° winders are the best compromise and require the least change in the natural gait of the stair user; 45° winders are also acceptable, as they are wider. The Code permits winders to turn through any angle between 30° and 45°, inclusive. This allows winder-type stairs to change direction through any angle between 30° (1 winder) and 90° (2 or 3 winders).

A-9.8.4.6. Tread Projection and Leading Edge of Steps.

A sloped or bevelled edge on nosings or leading edges of steps will make the tread more visible through light modelling. The sloped portion of the leading edge must not be too wide so as to reduce the risk of slipping of the foot. To reduce the risk of tripping, the leading edge must not reduce the effective tread depth to less than the required minimum tread depth less 15mm. Similarly, the projection of the tread behind the nosing can also cause tripping, particularly during a person's ascent. Figure A-9.8.4.6. illustrates the various dimensional requirements stated in Sentence 9.8.4.6.(1).

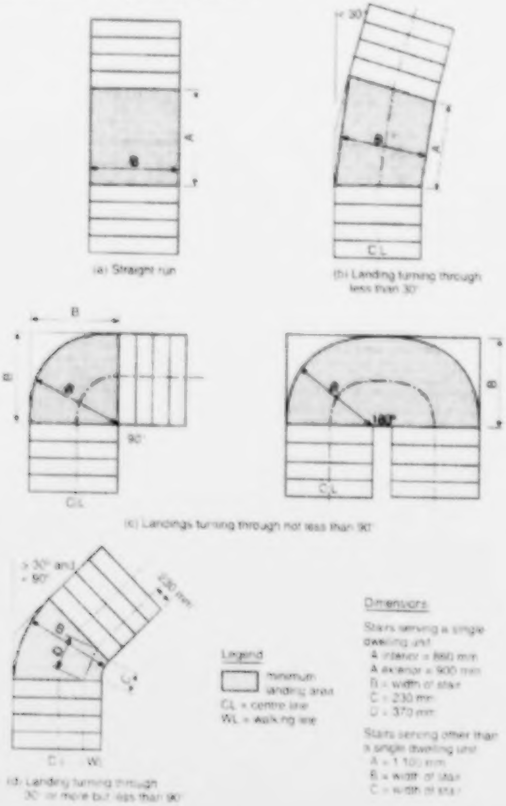

≥ minimum tread depth less 15 mm
width of curved or beveled edge ≤ 25 mm

e1

Figure A-9.8.4.6.
Tread Depth and Treatment of Leading Edge

A-9.8.6.3.(1) Dimensions of Landings.

Figure A-9.8.6.3.(1) illustrates various landing configurations.



(a) Straight run

(b) Landing turning through less than 30°

(c) Landings turning through not less than 90°

(d) Landing turning through 30° or more but less than 90°

Legend

▭ minimum landing area

CL = centre line

WL = walking line

Dimensions

Stairs serving a single dwelling unit:

A interior = 860 mm

A exterior = 900 mm

B = width of stair

C = 230 mm

D = 370 mm

Stairs serving other than a single dwelling unit:

A = 1 100 mm

B = width of stair

C = width of stair

Figure A-9.8.6.3.(1)
Landing Configurations

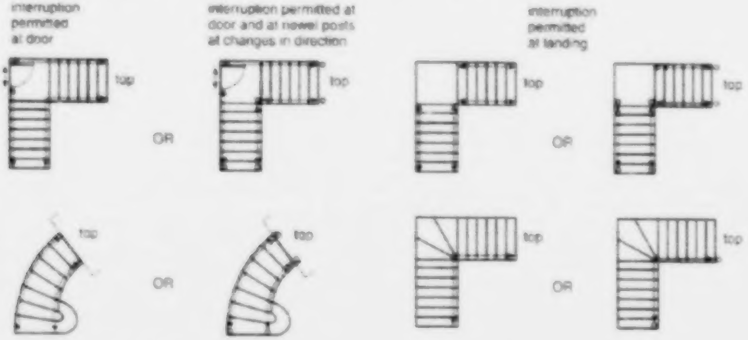
A-9.8.7.2. Continuity of Handrails.

The guidance and support provided by handrails is particularly important at the beginning and end of ramps and flights of stairs and at changes in direction such as at landings and winders.

The intent of the requirement in Sentence (1) for handrails to be continuous throughout the length of the stair is that the handrail be continuous from the bottom riser to the top riser of the stair. The required handrail may start back from the bottom riser only if it is supported by a newel post installed on the bottom tread. (See Figure A-9.8.7.2.)

For stairs or ramps serving a single dwelling unit, the intent of the requirement in Sentence (2) for handrails to be continuous throughout the length of the flight is that the handrail be continuous from the bottom riser to the top riser of the flight. Once again, the required handrail may start back from the bottom riser only if it is supported by a newel post installed on this line. (See Figure A-9.8.7.2.) With regard to stairs serving a single dwelling unit, the handrail may terminate at landings.

In the case of stairs within dwelling units that incorporate winders, the handrail should be configured so that it will in fact provide guidance and support to the stair user throughout the turn through the winder.


interruption permitted at door
interruption permitted at door and at newel posts at changes in direction
interruption permitted at landing
top
top
top
top
top
top
top
top
OR
OR
OR
OR

(a) Stair serving other than a single dwelling unit: handrails continuous through length of stair

(b) Stair serving a single dwelling unit: handrails continuous through length of flight

•—• minimum extent of handrail where handrail is required

• newel post

See Article 9.8.7.1. to determine the number of handrails required. Some stairs will require only one while some will require two or more.

Figure A-9.8.7.2.
Continuity of Handrails at the Top and Bottom of Stairs and Flights of Stairs

A-9.8.7.3.(1) Termination of Handrails.

Handrails are required to be installed so as not to obstruct pedestrian travel. To achieve this end, the rail should not extend so far into a hallway as to reduce the clear width of the hallway to less than the required width. Where the stair terminates in a room or other space, likely paths of travel through that room or space should be assessed to ensure that any projection of the handrail beyond the end of the stair will not interfere with pedestrian travel. As extensions of handrails beyond the first and last riser are not required in dwelling units [See Sentence 9.8.7.3.(2)] and as occupants of dwellings are generally familiar with their surroundings, the design of dwellings would not generally be affected by this requirement.

Handrails are also required to terminate in a manner that will not create a safety hazard to blind or visually impaired persons, children whose heads may be at the same height as the end of the rail, or persons wearing loose clothing or carrying items that might catch on the end of the rail. One approach to reducing potential hazards is returning the handrail to a wall, floor or post. Again, within dwelling units, where occupants are generally familiar with their surroundings, returning the handrail to a wall, floor or post may not be necessary. For example, where the handrail is fastened to a wall and does not project past the wall into a hallway or other space, a reasonable degree of safety is assumed to be provided; other alternatives may provide an equivalent level of protection.

A-9.8.7.3.(2) Handrail Extensions.

As noted in Appendix Note A-9.8.7.2., the guidance and support provided by handrails is particularly important at the beginning and end of ramps and flights of stairs and at changes in direction. The extended handrail provides guidance and allows users to steady themselves upon entering or leaving a ramp or flight of stairs. Such extensions are particularly useful to visually-impaired persons, and persons with physical disabilities or who are encumbered in their use of the stairs or ramp.

A-9.8.7.4. Height of Handrails.

Handrails that do not meet the height criteria for required handrails may be installed, provided they are in addition to the required handrails.

A-9.8.7.5.(2) Handrail Sections.

Handrails are intended to provide guidance and support to stair users. To fulfil this intent, handrails must be "graspable". Acceptable handrail sections include, but are not limited to, those shown in Figure A-9.8.7.5.(2).

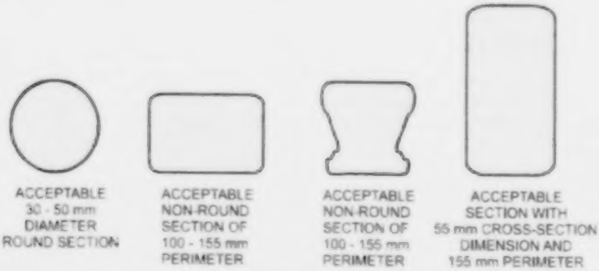


Figure A-9.8.7.5.(2)
Handrail Sections

A-9.8.7.7. Attachment of Handrails.

Handrails are intended to provide guidance and support to the stair user and to arrest falls. The loads on handrails may therefore be considerable. The attachment of handrails serving a single dwelling unit may be accepted on the basis of experience, structural design, or the prescriptive requirements of Sentence 9.8.7.7.(2).

A-9.8.8.1. Required Guards.

The requirements relating to guards stated in Part 9 are based on the premise that, wherever there is a difference in elevation of 600 mm or more between two floors, or between a floor or other surface to which access is provided for other than maintenance purposes and the next lower surface, the risk of injury in a fall from the higher surface is sufficient to warrant the installation of some kind of barrier to reduce the chances of such a fall. A wall along the edge of the higher surface will obviously prevent such a fall, provided the wall is sufficiently strong that a person cannot fall through it. Where there is no wall, a guard must be installed. Because guards clearly provide less protection than walls, additional requirements apply to guards to ensure that a minimum level of protection is provided. These relate to the characteristics described in notes A-9.8.8.3., A-9.8.8.5.(1) and (2), A-9.8.8.5.(3) and A-9.8.8.6.

e1 Examples of such surfaces where the difference in elevation could exceed 600 mm and consequently where guards would be required include, but are not limited to, landings, porches, balconies, mezzanines, galleries, and raised walkways. Especially in exterior settings, surfaces adjacent to walking surfaces, stairs or ramps often are not parallel to the walking surface or the surface of the treads or ramps. Consequently, the walking surface, stair or ramp may need protection in some locations but not in others. (See Figure A-9.8.8.1.) In some instances, grades are artificially raised close to walking surfaces, stairs or ramps to avoid installing guards. This provides little or no protection for the users. That is why the requirements specify differences in elevation not only immediately adjacent to the construction but also for a distance of 1 200 mm from it by requiring that the slope of the ground be within certain limits. (See Figure A-9.8.8.1.)

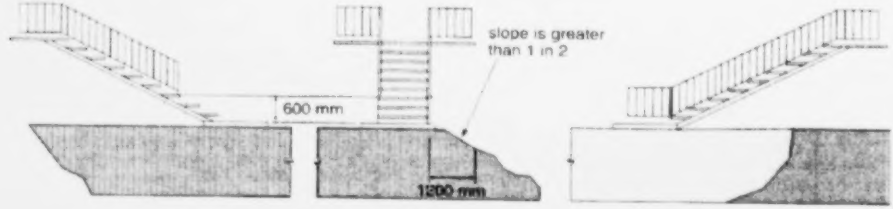


Figure A-9.8.8.1.
Required Locations of Guards

A-9.8.8.2. Loads on Guards.

Guards must be constructed so as to be strong enough to protect persons from falling under normal use. Many guards installed in dwelling units or on exterior stairs serving one or two dwelling units have demonstrated acceptable performance over time. The loading specified in the first row of Table 9.8.8.2. is intended to be consistent with the performance provided by these guards. Guards constructed in accordance with Supplementary Standard SB-7 are deemed to meet the requirements of Article 9.8.8.2.

The load on guards within dwelling units, or on exterior guards serving not more than two dwelling units, is to be imposed over an area of the guard such that, where standard balusters are used and installed at the maximum 100 mm spacing permitted for required guards, 3 balusters will be engaged. Where the balusters are wider, only two may be engaged unless they are spaced closer together. Where the guard is not required, and balusters are installed more than 100 mm apart, fewer balusters may be required to carry the imposed load.

A-9.8.8.3. Minimum Heights.

Guard heights are generally based on the waist heights of average persons. Generally, lower heights are permitted in dwelling units because the occupants become familiar with the potential hazards, and situations which lead to pushing and jostling under crowded conditions are less likely to arise.

A-9.8.8.5.(1) and (2) Risk of Falling through Guards.

The risk of falling through a guard is especially prevalent for children. Therefore, the requirements are stringent for guards in all buildings except industrial buildings, where children are unlikely to be present except under strict supervision.

A-9.8.8.5.(3) Risk of Children Getting Their Heads Stuck between Balusters.

The requirements to prevent children falling through guards also serve to provide adequate protection against this problem. However, guards are often installed where they are not required by the Code; i.e., in places where the difference in elevation is less than 600 mm. In these cases, there is no need to require the openings between balusters to be less than 100 mm. However, there is a range of openings between 100 mm and 200 mm in which children can get their heads stuck. Therefore, openings in this range are not permitted except in buildings of industrial occupancy, where children are unlikely to be present except under strict supervision.

A-9.8.8.6. Risk of Children Climbing Over Guards.

Guards are sometimes constructed with horizontal or near-horizontal members between balusters such that a ladder effect is achieved. This can be very tempting for young children to climb, thus exposing themselves to risk of falling over the guard. Such construction is not permitted for required guards in buildings of residential occupancy.

A-9.9.4.5.(1) Openings in Exterior Walls of Exits.

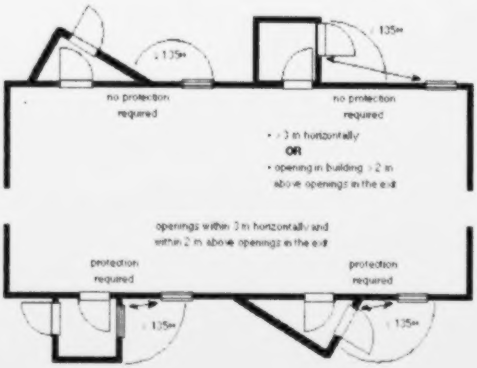

135°
135°
no protection required
no protection required
• > 3 m horizontally
OR
• opening in building > 2 m above openings in the exit
openings within 3 m horizontally and within 2 m above openings in the exit
protection required
protection required
135°
135°

Figure A-9.9.4.5.(1)
Protection of Openings in Exterior Walls of Exits

A-9.9.8.4.(1) Independent and Remote Exits.

Subsection 9.9.8. requires that some floor areas have more than one exit. The intent is to ensure that, if one exit is made untenable or inaccessible by a fire, one or more other exits will be available to permit the occupants to escape. However, if the exits are close together, all exits might be made untenable or inaccessible by the same fire. Sentence 9.9.8.4.(1), therefore, requires at least two of the exits to be located remotely from each other. This is not a problem in many buildings falling under Part 9. For instance, apartment buildings usually have exits located at either end of long corridors. However, in other types of buildings (e.g., dormitory and college residence buildings) this is often difficult to accomplish and problems arise in interpreting the meaning of the word "remote." Article 3.4.2.3. is more specific, generally requiring the distance between exits to be one half the diagonal dimension of the floor area or at least 9 m. However, it is felt that such criteria would be too restrictive to impose on the design of all the smaller buildings which are governed by Part 9. Nevertheless, the exits should be placed as far apart as possible and the Part 3 criteria should be used as a target. Designs in which the exits are so close together that they will obviously both become contaminated in the event of a fire are not acceptable.

A-9.10.1.3.(8) Installation of Sprinkler, Standpipe and Hose Systems.

Some provisions captured by the cross-reference to Part 3 go beyond the intended application of the cross-reference.

In the context of the cross-reference, Subsections 3.2.5. and 3.2.9. apply only where sprinkler, standpipe or hose systems are installed in a Part 9 building, whether the installation is voluntary or for the purpose of complying with the provisions in Part 9. Provisions in Part 3 that identify buildings or spaces in which these systems are to be installed do not apply.

A-9.10.1.4.(1) Commercial Cooking Equipment.

Part 6 refers to NFPA 96, "Installation of Equipment for the Removal of Smoke and Grease-laden Vapours from Commercial Cooking Equipment," which in turn references "Commercial Cooking Equipment." However, the deciding factor as to whether or not NFPA 96 applies is the potential for production of grease-laden vapours and smoke, rather than the type of equipment used. While NFPA 96 does not apply to domestic equipment for normal residential family use, it should apply to domestic equipment used in commercial, industrial, institutional and similar cooking applications where the potential for the production of smoke and grease-laden vapours exceeds that for normal residential family use.

A-9.10.3.1. Fire and Sound Resistance of Building Assemblies.

The tables found in Supplementary Standard SB-3 may be used to select building assemblies for compliance with Article 9.10.3.1. and Subsection 9.11.2. Assembles not listed in those tables are equally acceptable provided their fire and sound resistance can be demonstrated to meet the above-noted requirements on the basis of tests referred to in 9.10.3.1. and 9.11.1. or by using the data in Fire Performance Ratings in Supplementary Standard SB-2.

A-9.10.9.6.(1) Penetration of Fire-Rated Assemblies by Service Equipment.

This Sentence, together with Article 3.1.9.1., is intended to ensure that the integrity of fire-rated assemblies is maintained where they are penetrated by various types of service equipment.

For buildings regulated by the requirements in Part 3, fire stop materials used to seal openings around building services, such as pipes, ducts and electrical outlet boxes, must meet a minimum level of performance demonstrated by standard test criteria.

This is different from the approach in Part 9. Because of the type of construction normally used for buildings regulated by the requirements in Part 9, it is assumed that this requirement is satisfied by the use of generic fire stop materials such as mineral wool, gypsum plaster or Portland cement mortar.

A-9.10.9.16.(3) Separation between Dwelling Units and Garages.

The gas-tight barrier between a dwelling unit and an attached garage is intended to provide reasonable protection from carbon monoxide and gasoline fumes entering the dwelling unit. Construction assemblies incorporating an air barrier system will perform adequately with respect to gas tightness, provided reasonable care is exercised where the wall or ceiling is pierced by building services. Where a garage is open to the adjacent attic space above the dwelling unit it serves, a gas-tight barrier in the dwelling unit ceiling will also provide protection. Unit masonry walls forming the separation between a dwelling unit and an adjacent garage should be provided with two coats of sealer or plaster or covered with gypsum wallboard on the side of the wall exposed to the garage. All joints must be sealed to ensure continuity of the barrier. (See also Sentences 9.25.3.3.(3) to (8).)

A-9.10.12.4.(1) Protection of Overhang of Common Roof Space.

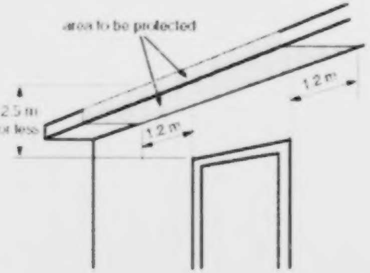


Figure A-9.10.12.4.
Protection of Overhang of Common Roof Space

A-9.10.12.4.(3) Protection at Soffits.

The materials required by this Sentence to be used as protection for soffit spaces in certain locations do not necessarily have to be the finish materials. They can be installed either behind the finishes chosen for the soffits or in lieu of these.

A-9.10.13.2.(1) Wood Doors in Fire Separations.

CAN4-S113 provides construction details to enable manufacturers to build wood core doors that will provide a 20 min fire-protection rating without the need for testing. The Standard requires each door to be marked with

(1) manufacturer's or vendor's name or identifying symbol,
(2) the words "Fire Door", and
(3) a reference to the fire-protection rating of 20 min.

A-9.10.15.1(1) Application of Subsection 9.10.15.

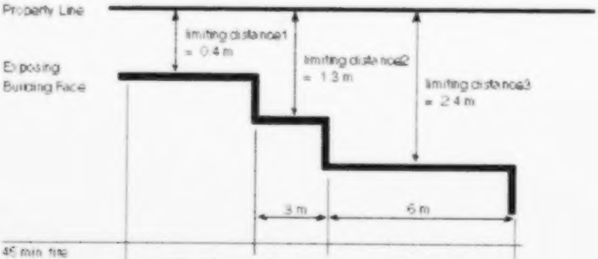
Subsection 9.10.15. applies to the spatial separation between buildings of residential occupancy where there is no dwelling unit above another dwelling unit. Such buildings include detached houses, semi-detached houses (doubles) and row houses, where there is no dwelling unit above another dwelling unit. The designer has the option of using either Subsection 9.10.14. or Subsection 9.10.15. for the determination of spatial separation requirements for these types of buildings. However, the requirements of these two subsections cannot be mixed.

A-9.10.15.4.(2) Staggered or Skewed Exposing Building Faces of Houses.

Studies at the National Fire Laboratory of the National Research Council have shown that, where an exposing building face is stepped back from the property line or is at an angle to the property line, it is possible to increase the percentage of glazing in those portions of the exposing building face further from the property line without increasing the amount of radiated energy that would reach the property line in the event of a fire in such a building. Figures A-9.10.15.4.(2).A to A-9.10.15.4.(2).C show how Sentence 9.10.15.4.(2) could be applied to exposing building faces that are stepped back from or not parallel to the property line.

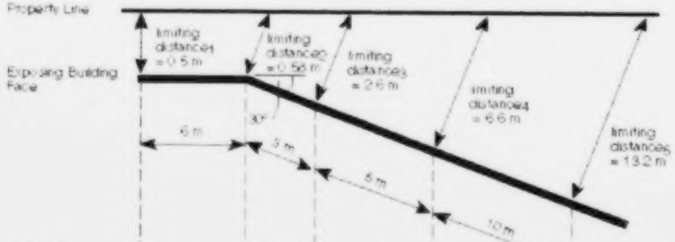
The following procedure can be used to establish the maximum permitted area of glazed openings for such facades:

1. Calculate the total area of the exposing building face, i.e. facade of the fire compartment, as described in the definition of exposing building face.
2. Identify the portions into which the exposing building face is to be divided. It can be divided in any number of portions, not necessarily of equal size.
3. Measure the limiting distance for each portion. The limiting distance is measured along a line perpendicular to the wall surface from the point closest to the property line.
4. Establish the line in Table 9.10.15.4. from which the maximum permitted percentage area of glazed openings will be read. The selection of the line depends on the maximum area of exposing building face for the whole fire compartment, including all portions, as determined in Step 1.
5. On that line, read the maximum percentage area of glazed openings permitted in each portion of the exposing building face according to the limiting distance for that portion.
6. Calculate the maximum area of glazed openings permitted in each portion. The area is calculated from the percentage found applied to the area of that portion.


Property Line
Exposing Building Face
limiting distance1 = 0.4 m
limiting distance2 = 1.3 m
limiting distance3 = 2.4 m
3 m
6 m

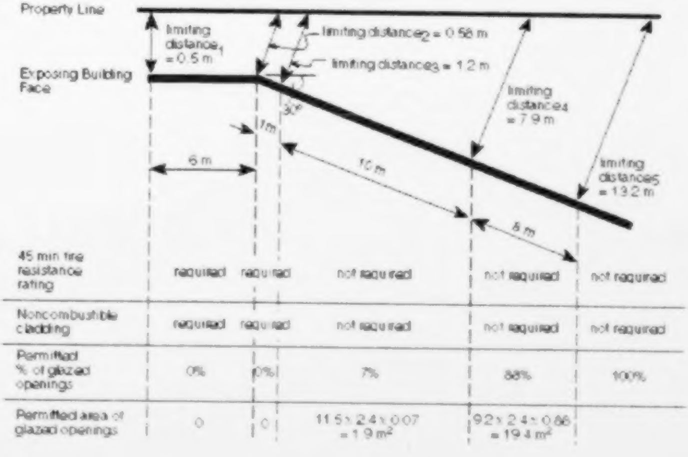
45 min fire resistance rating	required	not required	not required
Noncombustible cladding	required	not required	not required
Permitted % of glazed openings	0%	7%	12%
Permitted area of glazed openings	0	3 × 2.4 × 0.07 = 0.5 m²	6 × 2.4 × 0.12 = 1.7 m²

Figure A-9.10.15.4.(2).A
Example of Determination of Criteria for the Exposing Building Face of a Staggered Wall


Property Line
Exposing Building Face
limiting distance1 = 0.5 m
limiting distance2 = 0.58 m
limiting distance3 = 2.6 m
limiting distance4 = 6.6 m
limiting distance5 = 13.2 m
30°
6 m
3 m
6 m
10 m

45 min fire resistance rating	required	required	not required	not required	not required
Noncombustible cladding	required	required	not required	not required	not required
Permitted % of glazed openings	0%	0%	12%	88%	100%
Permitted area of glazed openings	0	0	6.9 × 2.4 × 0.12 = 2.0 m²	11.5 × 2.4 × 0.88 = 24.3 m²	

Figure A-9.10.15.4.(2).B
Example of Determination of Criteria for the Exposing Building Face of a Skewed Wall with One Arbitrary Division of the Wall


Property Line
limiting distance$_1$ = 0.5 m
limiting distance$_2$ = 0.58 m
limiting distance$_3$ = 1.2 m
Exposing Building Face
30°
1 m
6 m
10 m
limiting distance$_4$ = 7.9 m
limiting distance$_5$ = 13.2 m
8 m

45 min fire resistance rating	required	required	not required	not required	not required
Noncombustible cladding	required	required	not required	not required	not required
Permitted % of glazed openings	0%	0%	7%	88%	100%
Permitted area of glazed openings	0	0	$11.5 \times 2.4 \times 0.07 = 1.9\ m^2$	$9.2 \times 2.4 \times 0.88 = 19.4\ m^2$	

Figure A-9.10.15.4.(2).C
Example of Determination of Criteria for the Exposing Building Face of a Skewed Wall with a Different Arbitrary Division of the Wall

A-9.10.18.6.(1) Fire Alarm, Fire Detection and Smoke Detection Devices and Systems.

e$_1$ A number of provisions captured by the cross-reference to Subsection 3.2.4. address issues already addressed in Subsection 9.10.18.and so are not applicable to Part 9 buildings. For example, Articles 9.10.18.2. and 9.10.18.8. identify the Part 9 buildings where fire alarm systems are required, so Article 3.2.4.1. does not apply.

Note that, because the cross-reference relating to sprinkler systems in Sentence 9.10.1.2.(8) refers only to Subsection 3.2.5., the requirements of Subsection 3.2.4. regarding electrical supervision and monitoring do not normally apply to sprinkler systems in Part 9 buildings. However, where a sprinkler system is installed in lieu of heat and smoke detectors according to Sentence 9.10.18.3.(3), electrical supervision and monitoring of the sprinkler system must comply with the provisions in Subsection 3.2.4.

A-9.10.19.2.(1) Location of Smoke Alarms.

There are two important points to bear in mind when considering where to locate smoke alarms in dwelling units:

- The most frequent point of origin for fires in dwelling units is the living area.
- The main concern in locating smoke alarms is to provide warning to people asleep in bedrooms.

Thus a smoke alarm located in the living area and wired so as to sound another smoke alarm located near the bedrooms is the ideal solution. However, it is difficult to define exactly what is meant by "living area". It is felt to be too stringent to require a smoke alarm in every part of a dwelling unit that could conceivably be considered a "living area" (living room, family room, study, etc.). Sentence 9.10.19.2.(1) therefore addresses these issues by requiring at least one smoke alarm on every storey and setting a maximum distance that any point on a floor level can be from a smoke alarm. Thus, in a dwelling unit complying with Sentence 9.10.19.2.(1), every living area will probably be located within a reasonable distance of a smoke alarm. Nevertheless, where a choice arises as to where on a storey to locate the required smoke alarm or alarms, one should be located as close as possible to a living area, provided the requirement for proximity to bedrooms is also satisfied.

Regarding location of smoke alarms in bedroom areas, generally the most economical choice will be to locate one alarm in a hallway serving several bedrooms. However, in a small dwelling where the bedrooms may be close to cooking areas, placing one alarm inside each bedroom may be a better choice as it makes them less prone to false alarms.

A-9.10.20.3.(1) Fire Department Access Route Modification.

In addition to other considerations taken into account in the planning of fire department access routes, special variations could be permitted for a house or residential building that is protected with an automatic sprinkler system. The sprinkler system must be designed in accordance with the appropriate NFPA standard and there must be assurance that water supply pressure and quantity are unlikely to fail. These considerations could apply to buildings that are located on the sides of hills and are not conveniently accessible by roads designed for fire fighting equipment and also to infill housing units that are located behind other buildings on a given property.

A-9.11.1.1.(1) Sound Transmission Class Ratings.

The specified STC rating of 50 is considered the minimum acceptable value, but many builders prefer to design for STC 55 or more in high quality accommodation.

Another reason to choose assemblies rated higher than STC 50 is that the STC ratings of assemblies are based on laboratory tests, but the sound transmission of any assembly as constructed in the field may be significantly less than its rating. This can be due to sound leaks, departures from design, poor workmanship or indirect (flanking) transmission paths overlooked in design. To provide a margin of safety to compensate for these, builders often select wall and floor systems that have been rated at least 5 points higher than the design STC rating in laboratory tests.

Sound leaks can occur where one wall meets another, the floor, or the ceiling. Leaks may also occur where the wall finish is cut for the installation of equipment or services. Avoid back-to-back electrical outlets or medicine cabinets. Carefully seal cracks or openings so structures are effectively airtight. Apply sealant below the plates in stud walls, between the bottom of drywall sheets and the structure behind, around all penetrations for services and, in general, wherever there is a crack, a hole or the possibility of one developing. Sound-absorbing material inside a well-designed wall decreases sound transmission. It has another advantage; it also helps to reduce the effects of leaks due, perhaps, to poor workmanship.

Indirect or flanking transmission arises where the parts of a building are rigidly connected together and where cavities in hollow walls or floors, or continuous lightweight layers connect apartments. Sound travels in cavities, as vibration along surfaces and through walls, ceilings and floors to adjacent rooms. Many paths other than the direct one through the party wall or floor may be involved. To achieve good sound insulation, transmission along flanking paths must be minimized by introducing breaks and resilient connections in the construction. Some examples of bad and good details are shown in the illustration.

Changes to constructions should not be made without consultation with someone competent in the field of acoustical design. Adding extra layers of drywall to walls in an attempt to reduce sound transmission, can actually increase it if done incorrectly. For example, attaching drywall on resilient channels directly to an existing wall or ceiling usually increases low frequency sound transmission. Adding an additional layer of drywall inside a double layer wall will also seriously increase sound transmission. Adding blocking inside walls to reduce the risk of fire spread should be done so it does not increase vibration transmission from one part of a wall or floor to the other.

To verify that acoustical privacy is being achieved, a field test can be done at an early stage in the construction; ASTM E 336 will give a complete measurement. A simpler and less expensive method is ASTM E 597, "Determining a Single Number Rating of Airborne Sound Insulation in Multi Unit Building Specifications". The rating provided by this test is usually within 2 points of the STC obtained from ASTM E 336. It is useful for verifying performance and finding problems during construction. Alterations can then be made prior to project completion.

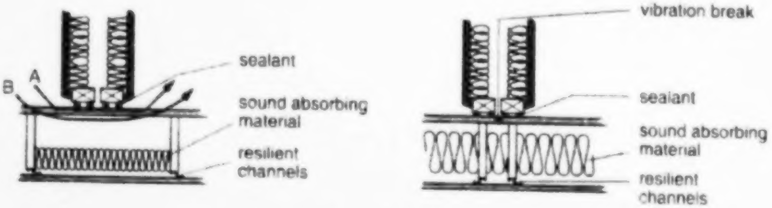


Figure A-9.11.1.1.
Cross Section Through Wall/floor Junctions Impact Noise

Impact Noise

e$_1$ Section 9.11. has no requirements for control of impact noise transmission. Footstep and other impacts can cause severe annoyance in multi-family residences. Builders concerned about quality and reducing occupant complaints will ensure that floors are designed to minimize impact transmission. A recommended criterion is that bare floors (tested without a carpet) should achieve an impact insulation class (IIC) of 55. Some lightweight floors that satisfy this requirement may still cause complaints about low frequency impact noise transmission. Adding carpet to a floor will always increase the IIC rating but will not necessarily reduce low frequency noise transmission. Good footstep noise rejection requires fairly heavy floor slabs or floating floors. Impact noise requirements are being considered for inclusion in future versions of the Building Code.

Most frequently used methods of test for impact noise are ASTM E 492, "Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using The Tapping Machine", or ASTM E 1007, "Field Measurement of Tapping Machine Impact Sound Transmission Through Floor-Ceiling Assemblies and Associated Support Structures".

Machinery Noise

Elevators, garbage chutes, plumbing, fans, and heat pumps are common sources of noise in buildings. To reduce annoyance from these, they should be placed as far as possible from sensitive areas. Vibrating parts should be isolated from the building structure using resilient materials such as neoprene or rubber.

A-Table 9.12.2.2. Minimum Depths of Foundations.

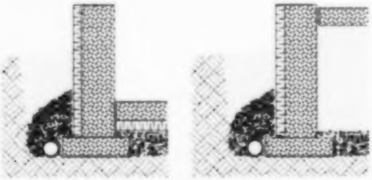
The requirements for clay soils or soils not clearly defined are intended to apply to those soils that are subject to significant volume changes with changes in moisture content.

A-9.12.3.3.(1) Deleterious Material in Backfill.

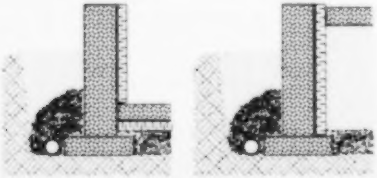
The deleterious debris referred to in this provision includes, but is not limited to:

- organic material and other material subject to decomposition and compaction, which could have an adverse effect on grading around the building,
- materials that will off-gas and have the potential to pose a health hazard, and
- materials that are incompatible with materials used in the foundations, footings, drainage materials or components, or other elements of the building whose required performance would be adversely affected.

A-9.12.2.2.(2) Depth and Insulation of Foundations.



Not insulated in a manner that will reduce heat flow to the soil beneath the footings



Insulated in a manner that will reduce heat flow to the soil beneath the footings

Figure A-9.12.2.2.
Foundation Insulation and Heat Flow to Footings

A-9.13.2.7.(1) and (2) Polyethylene under Slabs-on-Ground.

Finishing a concrete slab placed directly on polyethylene can, in many cases, cause problems for the inexperienced finisher. A rule of finishing, whether concrete is placed on polyethylene or not, is to never finish or "work" the surface of the slab while bleed water is present or before all the bleed water has risen to the surface and evaporated. If finishing operations are performed too early, such as before all the bleed water has risen and evaporated, surface defects such as blisters, crazing, scaling and dusting can result. This is often the case with slabs placed directly on polyethylene. The amount of bleed water that may come to the surface and the time required for this to happen is increased from that of a slab placed on a compacted granular base. The excess water in the mix from the bottom portion of the slab cannot bleed downward and out of the slab and be absorbed into the granular material below, because of the polyethylene. Therefore, all bleed water, including that from the bottom of the slab, must now rise through the slab to the surface. Quite often in such cases, finishing operations are begun too soon and surface defects result.

One solution that is often suggested is to place a layer of sand between the polyethylene and the concrete. However, this is not an acceptable solution for the following reason: it is unlikely that the polyethylene will survive the slab pouring process entirely intact. Nevertheless, the polyethylene will still be effective in retarding the flow of soil gas if it is in intimate contact with the concrete; soil gas will only be able to penetrate where a break in the polyethylene coincides with a crack in the concrete. The majority of concrete cracks will probably be underlain by intact polyethylene. On the other hand, if there is an intervening layer of a porous medium, such as sand, soil gas will be able to travel laterally from a break in the polyethylene to the nearest crack in the concrete and the total system will be much less resistant to soil gas penetration.

To reduce and/or control the cracking of concrete slabs, it is necessary to understand the nature and causes of volume changes of concrete and in particular those relating to drying shrinkage. The total amount of water in a mix is by far the largest contributor to the amount of drying shrinkage and resulting potential cracking that may be expected from a given concrete. The less total amount of water in the mix, the less volume change (due to evaporation of water), which means the less drying shrinkage that will occur. To lessen the volume change and potential cracking due to drying shrinkage, a mix with the lowest total amount of water that is practicable should always be used. To lower the water content of a mix, superplasticizers are often used to provide the needed workability of the concrete during the placing operation. High water/cementing materials ratio concretes usually have high water content mixes. They should be avoided to minimize drying shrinkage and cracking of the slab. The water/cementing materials ratio for slabs-on-ground should be no higher than 0.55.

A-9.13.4. Exclusion of Soil Gas.

Outdoor air entering a dwelling through above-grade leaks in the building envelope normally improves the indoor air quality in the dwelling by reducing the concentrations of pollutants and water vapour. It is only undesirable because it cannot be controlled. On the other hand, air entering a dwelling through below-grade leaks in the envelope may increase the water vapour content of the indoor air and may also bring in a number of pollutants which it picks up from the soil. This mixture of air, water vapour and pollutants is sometimes referred to as "soil gas". One pollutant often found in soil gas is radon.

Radon is a colourless, odourless, radioactive gas that occurs naturally as a result of the decay of radium. It is found to varying degrees as a component of soil gas in all regions of Canada and is known to enter dwelling units by infiltration into basements and crawl spaces. The presence of the decay products of radon in sufficient quantity can lead to increased risk of lung cancer.

The potential for high levels of radon infiltration is very difficult to evaluate prior to construction and thus a radon problem may only become apparent once the building is completed and occupied. Supplementary Standard SB-9 requires the application of certain radon exclusion measures in dwellings where methane or radon gasses are known to be a problem.

A-9.13.4.1.(4) Subfloor Depressurization in Houses with Preserved Wood Foundations.

Standard CAN/CSA-S406, "Construction of Preserved Wood Foundations", requires that a polyethylene sheet ground cover be installed under all floors-on-ground in buildings with preserved wood foundations. The use of a subfloor depressurization system may be acceptable with such a system, seeing as the standard doesn't mention otherwise, but the polyethylene sheet ground cover is an unconditional requirement of that standard. The polyethylene sheet cannot be forfeited in houses intended to conform to the standard and the depressurization system would have to be installed under the ground cover membrane.

A-9.14.2.1.(2) Insulation Applied to the Exterior of Foundation Walls.

In addition to the prevention of heat loss, some types of mineral fibre insulation, such as rigid glass fibre, are installed on the exterior of basement walls for the purpose of moisture control. This is sometimes used instead of crushed rock as a drainage layer between the basement wall and the surrounding soil in order to facilitate the drainage of soil moisture. Water drained by this drainage layer must be carried away from the foundation by the footing drains or the granular drainage layer in order to prevent it from developing hydro-static pressure against the wall. Provision must be made to permit the drainage of this water either by extending the insulation or crushed rock to the drain or by the installation of granular material connecting the two. The installation of such drainage layer does not eliminate the need for normal waterproofing or dampproofing of walls as specified in Section 9.13.

A-9.15.1.1. Application of Footing and Foundation Requirements to Decks and Similar Structures.

Decks, balconies, verandas and similar platforms that are attached to a building or that have an area greater than 10 m^2 are, by definition, considered as buildings or parts of buildings. Consequently, they are subject to the requirements in Section 9.15.

A-9.15.1.1.(1)(c) and 9.20.1.1.(l)(b) Flat Insulating Concrete Form Walls.

Insulating concrete form (ICF) walls are concrete walls that are cast into polystyrene forms, which remain in place after the concrete has cured. Flat ICF walls are solid ICF walls where the concrete is of uniform thickness over the height and width of the wall.

A-9.15.2.4.(1) Preserved Wood Foundations - Design Assumptions.

Tabular data and figures in CAN/CSA-S406, "Construction of Preserved Wood Foundations" are based upon the general principles provided in CAN/CSA-O86.1, "Engineering Design in Wood" with the following assumptions:

- soil bearing capacity: 75 kPa or more,
- clear spans for floors: 5 000 mm or less,
- floor loadings: 1.9 kPa for first floor and suspended floor, and 1.4 kPa for second storey floor,
- foundation wall heights: 2 400 mm for slab floor foundation, 3 000 mm for suspended wood floor foundation,
- top of granular layer to top of suspended wood floor: 600 mm,
- lateral load from soil pressure: equivalent to fluid pressure of 4.7 kPa per metre of depth,
- ground snow load: 3 kPa,
- basic snow load coefficient: 0.6,
- roof loads are carried to the exterior wall,
- dead loads:

dead loads:	roof	0.50 kPa
	floor	0.47 kPa
	wall (with siding)	0.32 kPa
	wall (with masonry veneer)	1.94 kPa
	foundation wall	0.27 kPa
	partitions	0.20 kPa

A-9.15.3.4.(2) Footing Sizes.

The footing sizes in Table 9.15.3.4. are based on typical construction consisting of a roof, not more than 3 storeys, and centre bearing walls or beams. For this reason, Clause 9.15.3.3.(1)(b) stipulates a maximum supported joist span of 4.9 m.

It has become common to use flat wood trusses or wood I-joists to span greater distances in floors of small buildings. Where these spans exceed 4.9 m, minimum footing sizes may be based on the following method:

(a) Determine for each storey the span of joists that will be supported on a given footing. Sum these lengths (sum_1).
(b) Determine the product of the number of storeys times 4.9 m (sum_2).
(c) Determine the ratio of sum_1, to sum_2.
(d) Multiply this ratio by the minimum footing sizes in Table 9.15.3.4. to get the required minimum footing size.

Example: A 2-storey house is built using wood I-joists spanning 6 m.

(a) $\text{sum}_1 = 6 + 6 = 12$ m
(b) $\text{sum}_2 = 4.9 \times 2 = 9.8$ m
(c) ratio $\text{sum}_1/\text{sum}_2 = 12/9.8 = 1.22$
(d) required minimum footing size = 1.22 x 350 mm (minimum footing size provided in Table 9.15.3.4.) = 427 mm.

a1 A-9.16.4.3.(1) Thickness.

Depressions and ridges often develop at the soil surface or granular base from construction activity prior to the placement of a concrete slab. Allowances for such irregularities in the base must be recognized. A maximum tolerance of -10 mm is permitted provided the minimum slab thickness at any point is not less than 65 mm and the mean thickness of the concrete slab (exclusive of topping) is 75 mm, as shown in Figure A-9.16.4.4.

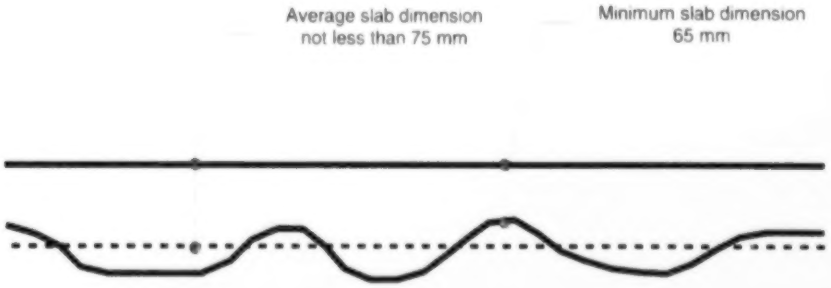

Average slab dimension not less than 75 mm
Minimum slab dimension 65 mm

**Table A-9.16.4.3.
Mean Thickness of Concrete Slabs**

A-9.17.2.2.(2) Lateral Support of Columns.

Because the Building code does not provide prescriptive criteria to describe the minimum required lateral support, structures are limited to those that have demonstrated effective performance over time and those that are designed according to Part 4. Verandas on early 20th century homes provide one example of structures whose floor and roof are typically tied to the rest of the building to provide effective lateral support. Large decks set on tall columns, however, are likely to require additional lateral support even where they are connected to the building on one side.

A-9.17.3.4. Design of Steel Columns.

The permitted live floor loads of 2.4 kPa and the spans described for steel beams, wood beams and floor joists are such that the load on columns could exceed 36 kN, the maximum allowable load on columns prescribed in CAN/CGSB-7.2, "Adjustable Steel Columns". In the context of Part 9, loads on columns are calculated from the supported area times the live load per unit area, using the supported length of joists and beams. The supported length is half of the joist spans on each side of the beam and half the beam span on each side of the column.

Dead load is not included based on the assumption that the maximum live load will not be applied over the whole floor. Designs according to Part 4 must consider all applied loads.

A-9.18.7.1.(3) Protection of Ground Cover in Warm Air Plenums.

The purpose of the requirement is to protect combustible ground cover from smoldering cigarette butts that may drop through air registers. The protective material should extend beyond the opening of the register and have up-turned edges, as a butt may be deflected sideways as it falls.

A-9.19.1.1.(1) Venting of Attic and Roof Spaces.

Controlling the flow of moisture by air leakage and vapour diffusion into roof and attic spaces is necessary to limit moisture-induced deterioration. Given that imperfections normally exist in the vapour barriers and air barrier systems, recent research indicates that venting of roof and attic spaces is generally still required. The exception provided in Article 9.19.1.1. recognizes that some specialized ceiling-roof assemblies, such as those used in some factory-built buildings, have, over time, demonstrated that their construction is sufficiently tight to prevent excessive moisture accumulation. In these cases, ventilation would not be required.

A-9.20.1.2. Seismic Zones.

Information on seismic zones for various localities can be found in Supplementary Standard SB-1.

A-9.20.5.1.(1) Masonry Support.

Masonry veneer must be supported on a stable structure in order to avoid cracking of the masonry due to differential movement relative to parts of the support. Wood framing is not normally used as a support for the weight of masonry veneer because of its shrinkage characteristics. Where the weight of masonry veneer is supported on a wood structure, as is the case for the preserved wood foundations referred to in Sentence 9.20.5.1.(1) for example, measures must be taken to ensure that any differential movement that may be harmful to the performance of masonry is minimized or accommodated. The general principle stated in Article 9.4.1.1., however, makes it possible to support the weight of masonry veneer on wood framing, provided that engineering design principles prescribed in Part 4 are followed to ensure that the rigidity of the support is compatible with the stiffness of the masonry being supported and that differential movements between the support and masonry are accommodated.

a1 A-Table 9.20.5.2.C. Steel Beams Supporting Masonry Veneer.

Design Assumptions

1. Density of Veneer:
   - Brick = 18.9 kN/m^3 (120 lb/ft^3)
   - Limestone or Sandstone = 22.62 kN/m^3 (144 lb/ft^3)

2. Dead Load of Veneer:
   - 70 mm Brick = 0.070 x 18.9 = 1.32 kPa
   - 89 mm Brick = 0.089 x 18.9 = 1.68 kPa
   - 100 mm Stone = 0.10 x 22.62 = 2.26 kPa

3. Design Standards:
   - CSA S304.1-94, "Masonry Design for Buildings (Limit States Design)"
   - CSA S16.1-94, "Limit States Design of Steel Structures"

4. Design Assumptions - Steel Angles in Table 9.20.5.2.B.:
   - For angle sizes (150 x 90 x 10; 150 x 90 x 13; 150 x 100 x 13; 180 x 100 x 10; 180 x 100 x 13)
   - Mid-span deflection limited to span/700 as per Note (6) of Table 9.20.5.2.A. in the Building Code.
   - Arch action of the brick veneer is assumed, which means that all brick weight within a 45 degree angle of the edge of the opening is not considered in the design of the lintel.
   - The steel yield strength is 300 MPa.

5. Design Assumptions - Steel Wide Flange Beams in Table 9.20.5.2.C.:
   - Mid-span deflection limited to span/700 as per Note (6) of Table 9.20.5.2.A in the Building Code for the brick load only.
   - Mid-span deflection limited to span/600 as per Clause 6.3.5.1 of CSA S304.1 for brick weight plus roof live load (see below).
   - Arch action of the brick veneer is assumed, which means that all brick weight within a 45 degree angle of the edge of the opening is not considered in the design of the lintel.
   - The beam is designed for a roof live load of 2.3 kN/m. This is to account for the fact that the steel beam will typically support a wood stud wall and a gable truss or outlook rafters as well as the brick veneer.
   - The beam is considered to be laterally unsupported along its length since it does not support a floor.
   - The beam is supported by steel columns at each end.
   - The steel yield strength is 300 MPa.

A-9.20.8.5. Distance from Edge of Masonry to Edge of Supporting Members.

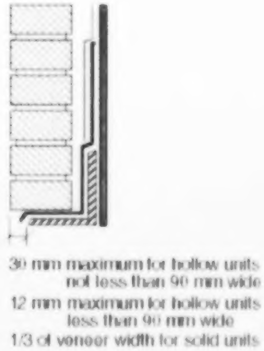

30 mm maximum for hollow units not less than 90 mm wide
12 mm maximum for hollow units less than 90 mm wide
1/3 of veneer width for solid units

Figure A-9.20.8.5.
Maximum Projection of Masonry Beyond its Support

A-9.20.12.2.(2) Corbelling of Masonry Foundation Walls.

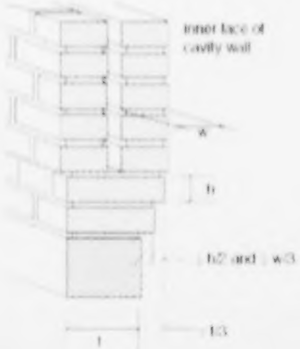

inner face of cavity wall
w
h
≤ h/2 and ≤ w/3
≤ t/3
t

Figure A-9.20.12.2.
Maximum Corbel Dimensions

A-9.20.13.9.(3) Dampproofing of Masonry Walls.

The reason for installing sheathing paper behind masonry walls is to prevent rainwater from reaching the interior finish if it should leak past the masonry. The sheathing paper intercepts the rainwater and leads it to the bottom of the wall where the flashing directs it to the exterior via weep holes. If the insulation is a type that effectively resists the penetration of water, and is installed so that water will not collect behind it, then there is no need for sheathing paper. If water that runs down between the masonry and the insulation is able to leak out at the joints in the insulation, such insulation will not act as a substitute for sheathing paper. If water cannot leak through the joints in the insulation but collects in cavities between the masonry and insulation, subsequent freezing could damage the wall. Where sheathing paper is not used, therefore, the adhesive or mortar should be applied to form a continuous bond between the masonry and the insulation. If this is not practicable because of an irregular masonry surface, then sheathing paper is necessary.

A-9.21.1.2.(1) Factory-Built Chimneys.

Certain solid-fuel burning appliances may be connected to factory-built chimneys other than those specified in Sentence 9.21.1.2.(1) if tests show that the use of such a chimney will provide an equivalent level of safety, as an alternative solution pursuant to Section 2.1. of Division C.

A-9.21.3.6.(2) Metal Chimney Liners.

Masonry chimneys with metal liners may be permitted to serve solid-fuel burning appliances if tests show that such liners will provide an equivalent level of safety, as an alternative solution pursuant to Section 2.1. of Division C.

A-9.21.4.4.(1) Location of Chimney Top.

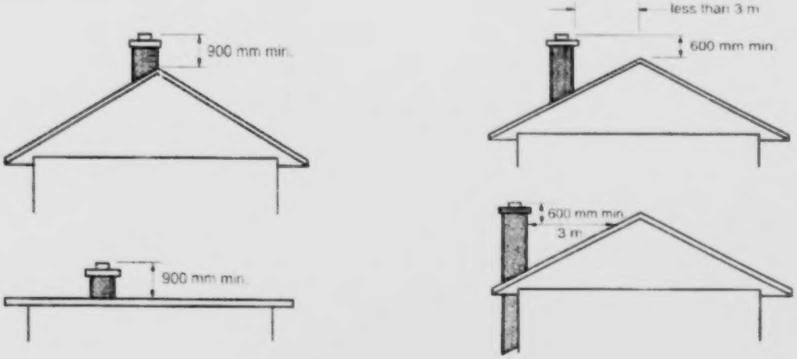


Figure A-9.21.4.4.
Vertical and Horizontal Distance from Chimney Top to Roof

A-9.21.4.5.(2) Lateral Support for Chimneys.

Where a chimney is fastened to the house framing with metal anchors, in accordance with CSA Standard CAN3-A370 "Connectors for Masonry", it is considered to have adequate lateral support. The portion of the chimney stack above the roof is considered as free standing and may require additional lateral support.

A-9.21.5.1.(1) Clearance from Combustible Materials.

For purposes of this Sentence, an exterior chimney can be considered to be one which has at least one surface exposed to the outside atmosphere or unheated space over the majority of its height. All other chimneys should be considered to be interior.

A-9.23.1.1. Structural Framing Systems Other than Light Wood-Frame Construction.

The prescriptive requirements in Section 9.23. apply only to standard light wood-frame construction. Other structural framing systems, such as post, beam and plank construction, plank frame wall construction, and log construction must be designed in accordance with Part 4.

A-9.23.1.1.(1) Application of Section 9.23.

In previous editions of the Code, Sentence 9.23.1.1.(1) referred to "conventional" wood-frame construction. Over time, conventions have changed and the application of Part 9 has expanded.

The prescriptive requirements provided in Section 9.23. still focus on lumber beams, joists, studs and rafters as the main structural elements of "wood-frame construction." The requirements recognize - and have recognized for some time - that walls and floors may be supported by components made of material other than lumber; for example, by foundations described in Section 9.15. or by steel beams described in Article 9.23.4.3. These components still fall within the general category of wood-frame construction.

With more recent innovations, alternative structural components are being incorporated into wood-frame buildings. Wood I-joists, for example, are very common. Where these components are used in lieu of lumber, the requirements in Section 9.23. that specifically apply to lumber joists do not apply to these components; for example, limits on spans and acceptable locations for notches and holes. However, requirements regarding the fastening of floor sheathing to floor joists still apply, and the use of wood I-joists does not affect the requirements for wall or roof framing.

Similarly, if steel floor joists are used in lieu of lumber joists, the requirements regarding wall or roof framing are not affected.

Conversely, Sentence 9.23.1.1.(1) precludes the installation of pre-cast concrete floors on wood-frame walls since these are not "generally comprised of ... small repetitive structural members ... spaced not more than 600 mm o.c."

Thus, the reference to "engineered components" in Sentence 9.23.1.1.(1) is intended to indicate that, where an engineered product is used in lieu of lumber for one part of the building, this does not preclude the application of the remainder of Section 9.23. to the structure, provided the limits to application with respect to cladding, sheathing or bracing, spacing of framing members, supported loads and maximum spans are respected.

A-9.23.3.1.(2) Standard for Screws.

The requirement that wood screws conform to ANSI B18.6.1., "Slotted and Recessed Wood Screws" is not intended to preclude the use of Robertson head screws. The requirement is intended to specify the mechanical properties of the fastener, not to restrict the means of driving the fastener.

A-9.23.3.3.(1) Prevention of Splitting.

The intent of the phrase "staggering the nails in the direction of the grain" is illustrated below.

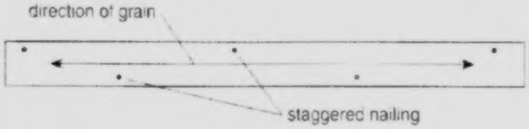


Figure A-9.23.3.3.
Staggered Nailing

A-9.23.4.2. Span Tables for Wood Joists, Rafters and Beams.

In these span tables the term "rafter" refers to a sloping wood framing member which supports the roof sheathing and encloses an attic space but does not support a ceiling. The term "roof joist" refers to a horizontal or sloping wood framing member that supports the roof sheathing and the ceiling finish but does not enclose an attic space. Where rafters or roof joists are intended for use in a locality having a higher specified roof snow load than shown in the tables, the maximum member spacing may be calculated as the product of the member spacing and specified snow load shown in the span tables divided by the specified snow load for the locality being considered. The following examples show how this principle can be applied:

(a) For a 3.5 kPa specified snow load, use spans for 2.5 kPa and 600 mm o.c. spacing but space members 400 mm o.c.
(b) For a 4.0 kPa specified snow load, use spans for 2.0 kPa and 600 mm o.c. spacing but space members 300 mm o.c.

The maximum spans in the span tables are measured from the inside face or edge of support to the inside face or edge of support.

In the case of sloping roof framing members, the spans are expressed in terms of the horizontal distance between supports rather than the length of the sloping member. The snow loads are also expressed in terms of the horizontal projection of the sloping roof. Spans for odd size lumber may be estimated by straight line interpolation in the tables.

These span tables may be used where members support a uniform live load only. Where the members are required to be designed to support a concentrated load, they must be designed in conformance with Subsection 4.3.1.

Supported joist length in Tables A-8, A-9 and A-10 means half the sum of the joist spans on both sides of the beam. For supported joist lengths between those shown in the tables, straight line interpolation may be used in determining the maximum beam span.

Tables A-1 to A-16 cover only the most common configurations. Especially in the area of floors, a wide variety of other configurations is possible: glued subfloors, concrete toppings, machine stress rated lumber, etc. The Canadian Wood Council publishes "The Span Book," a compilation of span tables covering many of these alternative configurations. Although these tables have not been subject to the formal committee review process, the Canadian Wood Council generates, all of the Code's span tables for wood structural components; thus Code users can be confident that the alternative span tables in "The Span Book" are consistent with the span tables in the Code and with relevant Code requirements.

Spans for wood joists, rafters and beams which fall outside the scope of these tables, including those for U.S. species and individual species not marketed in the commercial species combinations described in the span tables, can be calculated in conformance with CSA O86.1, "Engineering Design in Wood."

A-9.23.4.2.(2) Numerical Method to Establish Vibration-Controlled Spans for Wood Frame Floors.

In addition to the normal strength and deflection analyses, the calculations on which the floor joist span tables are based include a method of ensuring that the spans are not so long that floor vibrations could lead to occupants perceiving the floors as too "bouncy" or "springy." Limiting deflection under the normal uniformly distributed loads to 1/360 of the span does not provide this assurance. Normally, vibration analysis requires detailed dynamic modelling. However, the calculations for the span tables use the following simplified static analysis method of estimating vibration-acceptable spans:

- The span which will result in a 2-mm deflection of a single joist supporting a 1 kN concentrated midpoint load is calculated.
- This span is multiplied by a factor, K, to determine the "vibration-controlled" span for the entire floor system. If this span is less than the strength- or deflection-controlled span under uniformly distributed load, the vibration-controlled span becomes the maximum span.
- The K factor is determined from the following relationship:

$$\ln(K) = A - B \bullet \ln(S/S_{(2)}) + G$$

where

A, B = constants, the values of which are determined from Tables A-9.23.4.2.A. or B.
G = constant, the value of which is determined from Table A-9.23.4.2.C.
S_j = span which results in a 2 mm deflection of the joist in question under a 1 kN concentrated midpoint load
S_{184} = span which results in a 2 mm deflection of a 38 x 184 mm joist of same species and grade as the joist in question under a 1 kN concentrated midpoint load.

For a given joist species and grade, the value of K shall not be greater than K3, the value which results in a vibration-controlled span of exactly 3 m. This means that for vibration-controlled spans 3 m or less, **K** always equals K_3, and for vibration-controlled spans greater than 3 m, **K** is as calculated.

Note that, for a sawn lumber joist, the ratio S_j/S_{184} is equivalent to its depth (mm) divided by 184.

Due to rounding differences, the method, as presented here, might produce results slightly different from those produced by the computer program used to generate the span tables.

Table A-9.23.4.2.A.
Constants A and B for Calculating Vibration-Controlled Floor Joist Spans - General Cases

Subfloor Thickness, mm	With Strapping[1]			With Bridging			With Strapping and Bridging		
	Joist Spacing, mm			Joist Spacing, mm			Joist Spacing, mm		
	300	400	600	300	400	600	300	400	600
Constant A									
15.5	0.30	0.25	0.20	0.37	0.31	0.25	0.42	0.35	0.28
19.0	0.36	0.30	0.24	0.45	0.37	0.30	0.50	0.42	0.33
Constant B									
	0.33			0.38			0.41		
Column 1	2	3	4	5	6	7	8	9	10

Notes to Table A-9.23.4.2.A.:

(1) Gypsum board attached directly to joists can be considered equivalent to strapping.

Table A-9.23.4.2.B.
Constants A and B for Calculating Vibration-Controlled Floor Joist Spans - Special Cases

Subfloor Thickness, mm	Joists with Ceiling Attached to Wood Furring[1]						Joists with Concrete Topping[2]		
	Without Bridging			With Bridging			With or Without Bridging		
	Joist Spacing, mm			Joist Spacing, mm			Joist Spacing, mm		
	300	400	600	300	400	600	300	400	600
Constant A									
15.5	0.39	0.33	0.24	0.49	0.44	0.38	0.58	0.51	0.41
19.0	0.42	0.36	0.27	0.51	0.46	0.40	0.62	0.56	0.47
Constant B									
	0.34			0.37			0.35		
Column 1	2	3	4	5	6	7	8	9	10

Notes to Table A-9.23.4.2.B.:

(1) Wood furring means 19 x 89 mm boards not more than 600 mm o.c., or 19 x 64 mm boards not more than 300 mm o.c. For all other cases, see Table A-9.23.4.2.A.

(2) 30 mm to 51 mm normal weight concrete (not less than 20 MPa) placed directly on the subflooring.

Table A-9.23.4.2.C.
Constant G for Calculating Vibration-Controlled Floor Joist Spans

Floor Description	Constant G
Floors with nailed(1) subfloor	0
Floor with nailed and field-glued(2) subfloor, vibration-controlled span greater than 3 m	0.10
Floor with nailed and field-glued(2) subfloor, vibration-controlled span 3 m or less	0.15
Column 1	2

Notes to Table A-9.23.4.2.C.:

(1) Common wire nails, spiral nails or wood screws can be considered equivalent for this purpose.

(2) Subfloor field-glued to floor joists with elastomeric adhesive complying with standard CAN/CGSB-71.26-M, "Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems".

Additional background information on this method can be found in the following publications:

- Onysko, D.M. Serviceability Criteria for Residential Floors Based on a Field Study of Consumer Response. Project 03-50-10-008. Forintek Canada Corp., Ottawa, Canada 1985.
- Onysko, D.M. Performance Criteria for Residential Floors Based on Consumer Responses. 1988 International Conference on Timber Engineering, Seattle, September 19-22, Forest Products Research Society, Vol.1, 1988, pp. 736-745.
- Onysko, D.M. Performance and Acceptability of Wood Floors - Forintek Studies. Proceedings of Symposium/Workshop on Serviceability of Buildings, Ottawa, May 16-18, National Research Council of Canada, Ottawa, 1988.

a1 A-9.23.4.3.(1) Maximum Spans for Steel Beams Supporting Floors in Dwellings.

A beam may be considered to be laterally supported if wood joists bear on its top flange at intervals of 600 mm or less over its entire length, if all the load being applied to this beam is transmitted through the joists and if 19 mm by 38 mm wood strips in contact with the top flange are nailed on both sides of the beam to the bottom of the joists supported. Other additional methods of positive lateral support are acceptable.

For supported joist lengths intermediate between those in the table, straight line interpolation may be used in determining the maximum beam span.

Design Assumptions for Tables A-20 to A-29 (Steel Beams Supporting Roofs and Floors)

1. Density of Brick Veneer:
   - Brick = 18.9 kN/m^3 (120 lb/ft^3)

2. Dead Load of Brick Veneer:
   - 89 mm Brick = 0.089 x 18.9 = 1.68 kPa
   - Brick loading on beam = 3 m high brick x 1.68 = 5.04 kN/m. This is based on a single storey wall with windows and a brick gable above the top of the stud wall. In this case, the windows in the exterior wall nullify the arch action of the brick and the load is applied uniformly along the length of the beam.

3. Dead Load of Structure:
   - Roof = 0.62 kPa (Asphalt shingle roof)
   - Floor = 1.5 kPa as per Appendix Note A-Table 9.23.4.3.

4. Live Loads:
   - Floor = 1.9 kPa
   - Roof = as indicated in the Tables

5. Design Standards:
   - CSA S304.1-94, "Masonry Design for Buildings (Limit States Design)"
   - CSA S16.1-94, "Limit States Design of Steel Structures"

6. Design Assumptions:
   - Mid-span deflection limited to span/600 as per Clause 6.3.5.1 of CSA S304.1 for brick weight plus live load. The self-weight of structure is typically on the beam prior to the application of the brick so the deflection check need only include live and brick loads.
   - For siding walls the mid-span deflection is limited to span/360 on live load.

A-Table 9.23.4.3. Spans for Steel Beams.

The spans are based on the following assumptions:

- Simply supported beam spans
- Laterally supported top flange
- Yield strength 350 MPa
- Deflection limit L/360
- Live load = 1.9 kPa/1st floor, 1.4 kPa/2nd floor
- Dead load 1.5 kPa.

A-9.23.4.4. Concrete Topping.

Vibration- controlled spans given in Table A-2 for concrete topping are based on a partial composite action between the concrete, subflooring and joists. Normal weight concrete having a compressive strength of not less than 20 MPa, placed directly on the subflooring, provides extra stiffness and results in increased capacity. The use of a bond breaker between the topping and the subflooring, or the use of lightweight concrete topping limits the composite effects.

Where either a bond breaker or lightweight topping is used, Table A-1 may be used but the additional dead load imposed by the concrete must be considered. The addition of 51 mm of concrete topping can impose an added load of 0.8 to 1.2 kPa, depending on the density of the concrete.

Example:

Assumptions:
- basic dead load = 0.5 kPa
- topping dead load = 0.8 kPa
- total dead load = 1.3 kPa
- live load = 1.9 kPa
- vibration limit: per A-9.23.4.2.(2)
- deflection limit = 1/360
- ceiling attached directly to joists, no bridging

The spacing of joists in the span tables can be conservatively adjusted to allow for the increased load by using the spans in Table A-1 for 600 mm spacing, but spacing the joists 400 mm apart. Similarly, floor beam span tables can be adjusted by using 4.8 m supported length spans for cases where the supported length equals 3.6 m.

A-9.23.8.3. Joint Location in Built-Up Beams.

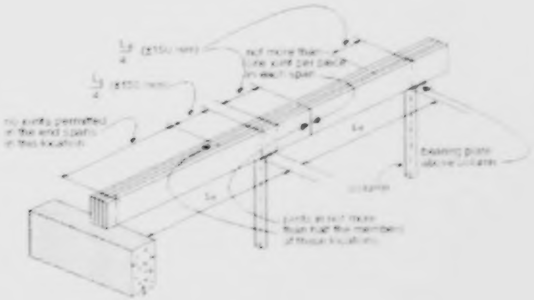

$\frac{L_s}{4}$ (±150 mm)
$\frac{L_s}{4}$ (±150 mm)
not more than one joint per piece in each span
no joints permitted in the end spans in this location
L_s
L_s
bearing plate above column
column
joints in not more than half the members at these locations

Figure A-9.23.8.3.
Joint Location in Built-up Beams

A-9.23.10.2. Bracing.

Traditionally, diagonal bracing has been provided at the corners of wood framed walls to provide resistance against wind racking forces. Laboratory tests have indicated, however, that the bracing that had been traditionally used contributed relatively little to the overall strength of the wall. Most of the racking resistance was in effect provided by the interior finish. Because of this, the requirements for bracing were deleted in the late 1950's. (See "Shear Resistance of Wood Frame Walls," by A.T. Hansen, Building Practice Note 61, Institute for Research in Construction, National Research Council, Ottawa.)

Where the interior is not finished, however, bracing is necessary if the siding itself or the sheathing does not provide the required racking strength. If panel type siding is used, or if the sheathing consists of plywood, OSB, waferboard, gypsum board, diagonal lumber, or fibreboard sheathing, additional bracing is not considered necessary because of the wind bracing provided by these materials. Where bracing is provided, it must be installed at roughly a 45° angle on each wall and in each storey, extending the full height of the storey. This type of bracing provides considerably greater resistance to wind forces than the traditional bracing, which was found to be relatively ineffective. The permission to omit bracing assumes typical house designs. Some buildings may have reduced resistance to racking forces as a result of their configuration. These include tall narrow buildings in exposed locations with large door or window openings located in the short sides. In such cases, racking resistance can be improved by ensuring that paneled sections are placed adjacent to the openings. The Code does not address the issue of bracing of the structure during construction. It is often necessary to provide temporary bracing until the interior finish or sheathing is installed; however, this is not a Code requirement.

A-9.23.10.4.(1) Fingerjoined Lumber.

The NLGA "Standard Grading Rules for Canadian Lumber," referenced in 9.3.2.1. refers to two special product standards, SPS-1,"Fingerjoined Structural Lumber," and SPS-3, " Fingerjoined Stud Lumber - Vertical Use Only," produced by NLGA. Material identified as conforming to these standards is considered to meet the requirements in this Sentence for joining with a structural adhesive. Lumber fingerjoined in accordance with SPS-3 should be used as a vertical end-loaded member in compression only, where sustained bending or tension-loading conditions are not present, and where the moisture content of the wood will not exceed 19%. Fingerjoined lumber may not be visually regraded or remanufactured into a higher stress grade even if the quality of the lumber containing fingerjoints would otherwise warrant such regrading.

A-9.23.10.6.(2) Single Studs at Sides of Openings.

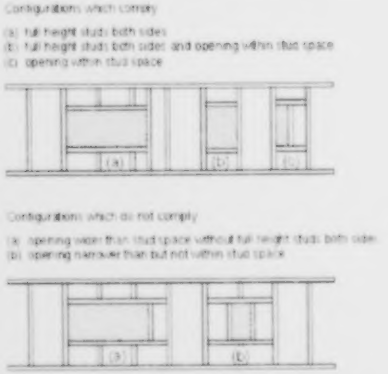

Configurations which comply
(a) full height studs both sides
(b) full height studs both sides and opening within stud space
(c) opening within stud space
(a)
(b)
(c)
Configurations which do not comply
(a) opening wider than stud space without full height studs both sides
(b) opening narrower than but not within stud space
(a)
(b)

Figure A-9.23.10.6.A.
Single Studs at Openings in Non-loadbearing Interior Walls

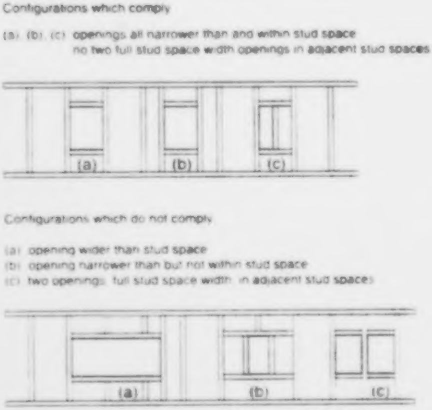

Configurations which comply
(a) (b) (c) openings all narrower than and within stud space
no two full stud space width openings in adjacent stud spaces
(a)
(b)
(c)
Configurations which do not comply
(a) opening wider than stud space
(b) opening narrower than but not within stud space
(c) two openings (full stud space width) in adjacent stud spaces
(a)
(b)
(c)

Figure A-9.23.10.6.B.
Single Studs at Openings in All Other Walls

a1 A-9.23.10.1.(2) Tall Stud Walls.

Design Assumptions for Tables A-30 to A-33.

1. Roof dead load is 0.5 kPa (asphalt shingle roof) as per rafter and lintel tables in the Building Code.

2. Specified roof snow load is the factored load incorporating rain load as per the rafter, header and lintel spans in the Building Code.

3. Wind loads are based on wind loads in the 2006 Building Code and the 2005 edition of the NBC as adopted in the *Engineering Guide for Wood Frame Construction* published by the Canadian Wood Council.
   a. Basic wind pressure is the 1 in 50 year pressure found in Table 1.2 of Supplementary Standard SB-1.
   b. Ce = 0.7 as per Sentence 4.1.7.1.(5)(b) in the Building Code.
   c. CpCg = -2.1 for ultimate limit state for wind acting alone.
   d. CpCg = -1.75 for the serviceability limit state.
   e. CpCg = 1.5 for wind acting in combination with gravity loads.
   f. Cpi varied from -0.45 to 0.3 as per *User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)*. Where external wind was a pressure (wind acting in combination with axial loads) the internal wind suction coefficient of -0.45 was used. Where external wind was suction (wind acting alone) the internal wind pressure coefficient of 0.3 was used.
   g. Cgi = 2.0 as per Sentence 4.1.7.1.(6)(c) in the Building Code.
   h. The importance factors used to calculate wind loads were 1.0 at the ultimate limit state and 0.75 at the serviceability limit state as per Table 4.1.7.1. in the Building Code.

4. Ultimate Limit State loads cases were in accordance with Table 4.1.3.2. in the Building Code.
   a. 1.4 axial dead load
   b. 1.25 axial dead load + 1.5 axial snow load
   c. 1.25 axial dead load + 1.5 axial snow load + 0.4 lateral wind load
   d. 1.25 axial dead load + 0.5 axial snow load + 1.4 lateral wind load
   e. 1.4 lateral wind load

5. Serviceability Limits States, based on the *Engineering Guide for Wood Frame Construction*, were calculated using specified lateral wind loads, and included:
   a. Deflection limit of stud length/180 for walls with siding, and
   b. Deflection limit of stud length/360 for walls with brick cladding.

6. Stud resistance was calculated as per CSA O86 and adopted for the *Engineering Guide for Wood Frame Construction*
   a. The system factors used were Case 2 load-sharing for bending moment resistance and Case 1 for compression resistance parallel to grain.
   b. A load duration factor of 1.25 was used where lateral wind acted alone or in combination with axial loads.

7. Fastening requirements are based on the short-term nail resistance values given in CSA O86-01.

a1

A-9.23.10.7.(2) Stud Posts Supporting Girder Trusses and Beams

Design Assumptions

1. Roof Load = 0.62 kPa (Asphalt shingle roof)

2. Design Standards: CSA 086-01, "Engineering Design in Wood"

3. Design Assumptions:
   - The studs are braced from buckling about their weak axis by the attachment of the wall sheathing.
   - The post is designed for axial loading applied at the centre of the stud cross-section (concentric loading).
   - Stud grade material has been assumed.
   - The stud resistance is based on the compressive resistance parallel to grain (P_r) and the bearing resistance of the wall plate (Q_r).
   - In the calculation of P_r, a system factor (K_H) of 1.0 was used.
   - In the calculation of Q_r, a size factor (K_{Zcp}) of 1.15 was used since the wall plate width is greater than two times the thickness. A length of bearing factor (K_B) of 1.0 was used since the stud post can occur at a splice in the wall plate.
   - The post size has been limited to 5 plies.
   - The post size is maintained through all storeys directly below the girder truss or beam until the load is transferred to the foundation wall.

A-9.23.13.11.(2) Wood Roof Truss Connections.

Sentence 9.23.13.11.(2) requires that the connections used in wood roof trusses be designed in conformance with Subsection 4.3.1. The designer of wood trusses should be skilled in the work concerned, since wood roof trusses are complex structures which depend on a number of components (chord members, web members, cross bracing, connectors) working together to function safely. This complexity precludes the standardization of truss design into tables comprehensive enough to satisfy the variety of roof designs required by the housing industry.

A-9.23.14.2.(4) Water Absorption Test.

A method for determining water absorption is described in ASTM D 1037, "Evaluating the Properties of Wood-Base Fiber and Particle Panel Materials". The treatment to reduce water absorption may be considered to be acceptable if a 300 mm x 300 mm sample when treated on all sides and edges does not increase in weight by more than 6% when tested in the horizontal position.

A-9.23.14.4.(2) OSB.

CSA O437.0, "OSB and Waferboard," requires that Type O (aligned or oriented) panels be marked to show the grade and the direction of face alignment.

A-9.24.3.2.(3) Framing Above Doors in Steel Stud Fire Separations.

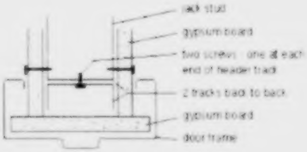


Figure A-9.24.3.2.
Steel Stud Header Detail

A-9.25.1.2. Location of Low Permeance Materials.

Low Air- and Vapour-Permeance Materials and Implications for Moisture Accumulation

Generally the location in a building assembly of a material with low air permeance is not critical; it can restrict outward movement of indoor air whether it is located near the outer surface of the assembly, near the inner surface, or at some intermediate location, and such restriction of air movement is generally beneficial, whether or not the particular material is designated as part of the air barrier system. However, if such a material also has the characteristics of a vapour barrier (i.e., low permeability to water vapour) and low thermal resistance, its location must be chosen more carefully in order to avoid moisture accumulation.

Any moisture from the indoor air which diffuses through the inner layers of the assembly or is carried by air leakage through those layers may be prevented from passing right through the assembly by such a material. This will usually not cause a problem if the material is located where the temperature is above the dew point of the indoor air; the water vapour will remain as vapour, the humidity level in the assembly will come to equilibrium with that of the indoor air, further accumulation of moisture will cease or stabilize at a low rate, and no harm will be done.

But if the low air- and vapour-permeance material is located where the temperature is below the dew point of the air at that location, water vapour will condense and accumulate as water or ice, which will reduce the humidity level and encourage the movement of more water vapour into the assembly. If this temperature remains below the dew point for any length of time, significant moisture could accumulate. When warmer weather returns, the presence of a material with low water vapour permeance can retard drying of the accumulated moisture. Moisture which remains into warmer weather can support the growth of decay organisms.

Cladding

Different cladding materials have different vapour permeances and different degrees of susceptibility to moisture deterioration. They are each installed in different ways that are more or less conducive to the release of moisture that may accumulate on the inner surface. Sheet or panel-type cladding materials, such as metal sheet, have a vapour permeance less than 60 ng/(Pa•s•m^2). Sheet metal cladding that has lock seams also has a low air leakage characteristic and so must be installed outboard of a drained and vented air space. Assemblies clad with standard residential vinyl or metal strip siding do not require additional protection as the joints are not so tight as to prevent the dissipation of moisture.

Sheathing

Like cladding, sheathing materials have different vapour permeances and different degrees of susceptibility to moisture deterioration. Low-permeance sheathing may serve as the vapour barrier if it can be shown that the temperature of the interior surface of the sheathing will not fall below that at which saturation will occur. This may be the case where insulating sheathing is used.

Thermal Insulation

Where low-permeance foamed plastic is the sole thermal insulation in a building assembly, the temperature of the inner surface of this element will be close to the interior temperature. In this case, no additional vapour barrier is needed to control condensation within the assembly due to vapour diffusion. However, where low-permeance thermal insulation is installed on the outside of an insulated frame wall, the temperature of the inner surface of the insulation may fall below the dew point. In this case, a separate element must be installed to provide the necessary vapour diffusion protection.

Air Barrier Systems

In residential construction, the airtight element in the air barrier system often provides the required resistance to vapour diffusion and thereby also serves as the vapour barrier. In this case, the combined air/vapour barrier must be positioned sufficiently close to the warm side of the assembly so that its temperature remains above the dew point temperature at that location.

Assumptions Followed in Developing Table 9.25.1.2.

Article 9.25.1.2. specifies that a low air- and vapour-permeance material must be located on the warm face of the assembly, outboard of a vented air space, or within the assembly at a position where its inner surface is likely to be warm enough for most of the heating season such that no significant accumulation of moisture will occur. This last position is defined by the ratio of the thermal resistance values outboard and inboard of the innermost impermeable surface of the material in question, assuming that not less than a Type 2 vapour barrier [60 ng/(Pa•s•m^2)] is installed as required by Subsection 9.25.4. The thermal resistance ratios also assume that, in regions with colder winters, the interior relative humidity (RH) does not exceed 35% for extended periods over the heating season.

Health Canada recommends indoor relative humidities between 35% and 50% for healthy conditions. ASHRAE accepts a 30% to 60% range. Environments that are much drier tend to exacerbate respiratory problems and allergies; more humid environments tend to support the spread of microbes, moulds and dust mites, which can adversely affect health.

In most of Canada in the winter, indoor RH is limited by the exterior temperature and the corresponding temperature on the inside of windows. During colder periods, indoor RH higher than 35%) will cause significant condensation on windows. When this occurs, occupants are likely to increase the ventilation to remove excess moisture. Although indoor RH may exceed 35% for short periods when the outside temperature is warmer, the criteria provided in Table 9.25.1.2. will still apply. Where higher relative humidities are maintained for extended periods in these colder climates, the ratios provided in the Table may not provide adequate protection. Some occupancies require that RH be maintained above 35% throughout the year, and some interior spaces support activities, such as swimming, that create high relative humidities. In these cases, Table 9.25.1.2. cannot be used and the position of the materials must be determined according to Part 5.

It should be noted that Part 9 building envelopes in regions with colder winters have historically performed acceptably when the interior RH does not exceed 35% over most of the heating season. With tighter building envelopes, it is possible to raise interior RH levels above 35%. There is no information, however, on how Part 9 building envelopes will perform when exposed to these higher indoor RH levels for extended periods during the heating season over many years. Operation of the ventilation system, as intended to remove indoor pollutants, will maintain the lower RH levels as necessary.

Calculating Inboard to Outboard Thermal Resistance

The method of calculating the inboard to outboard thermal resistance ratio is illustrated in Figure A-9.25.1.2. The example wall section shows three planes where low air- and vapour-permeance materials have been installed. A vapour barrier, installed to meet the requirements of Subsection 9.25.4., is on the warm side of the insulation consistent with Clause 9.25.1.2.(1)(a) and Sentences 9.25.4.1.(1) and 9.25.4.3.(2). The vinyl siding has an integral drained and vented air space consistent with Clause 9.25.1.2.(1)(c). The position of the interior face of the low-permeance insulating sheathing, however, must be reviewed in terms of its thermal resistance relative to the overall thermal resistance of the wall, and the climate where the building is located.

Comparing the RSI ratio from the example wall section with those in Table 9.25.1.2. indicates that this wall would be acceptable in areas with Celsius degree-day values up to 7999, which includes, for example, Geraldton. (Degree-day values for various locations in Ontario are provided in Supplementary Standard SB-1.

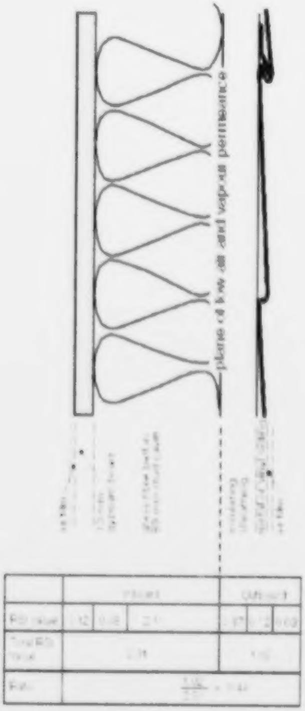


Figure A-9.25.1.2.
Example Wall Section Showing Thermal Resistance Inboard and Outboard of a Plane of Low Air and Vapour Permeance

A similar calculation would indicate that, for a similar assembly but with a 140 mm stud cavity filled with an RSI 3.52 batt, the ratio would be 0.28. Thus such a wall could be used in areas with Celsius degree-day values up to 4999, which includes, for example, Ottawa. Similarly, if half the thickness of the same low permeance sheathing were used, the ratio with an 89 mm cavity would be 0.25, permitting its use in areas with Celsius degree-day values up to 4999. The ratio with a 140 mm cavity would be 0.16; thus this assembly could not be used anywhere, since this ratio is below the minimum permitted in Table 9.25.1.2.

Table A-9.25.1.2.A. shows the minimum thicknesses of low permeance insulating sheathing necessary to satisfy Article 9.25.1.2. in various degree-day zones for a range of resistivity values of insulating sheathing. These thicknesses are based on the detail shown in Figure A-9.25.1.2. but could also be used with cladding details, such as brick veneer or wood siding, which provide equal or greater outboard thermal resistance.

Table A-9.25.1.2.A.
Minimum Thicknesses of Low Permeance Insulating Sheathing

Celsius Heating Degree-days	Min. RSI Ratio	38 x 89 Framing					38 x 140 Framing				
		Min. Outboard Thermal Resistance, RSI	Min. Sheathing Thickness, mm				Min. Outboard Thermal Resistance, RSI	Min. Sheathing Thickness, mm			
			Sheathing Thermal Resistance, RSI/mm					Sheathing Thermal Resistance, RSI/mm			
			0.03	0.0325	0.035	0.04		0.03	0.0325	0.035	0.04
≤ 4999	0.20	0.46	10	10	9	8	0.72	19	17	16	14
5000 to 5999	0.30	0.69	18	17	16	14	1.07	31	28	26	23
6000 to 6999	0.35	0.81	22	20	19	16	1.25	37	34	32	28
7000 to 7999	0.40	0.92	26	24	22	19	1.43	43	39	37	32
8000 to 8999	0.50	1.16	34	31	29	25	1.79	55	50	47	41
9000 to 9999	0.55	1.27	37	34	32	28	1.97	61	56	52	45
10000 to 10999	0.60	1.39	41	38	35	31	2.15	67	61	57	50
11000 to 11999	0.65	1.5	45	42	39	34	2.33	73	67	62	54
≥ 12000	0.75	1.73	53	49	45	40	2.69	85	78	72	63
Column 1	2	3	4	5	6	7	8	9	10	11	12

The air leakage characteristics and water vapour permeance values for a number of common materials are given in Table A-9.25.1.2.B. These values are provided on a generic basis; specific materials may have values differing somewhat from those in the table.

Table A-9.25.1.2.B.
Air and Vapour Permeance Values(1)

Material	Air Leakage Characteristic, L/(s • m^2) at 75 Pa	Water Vapour Permeance, ng/(Pa•s•m^2)
Sheathing (low insulation value)		
12.7-mm foil-faced gypsum board	negligible	negligible
6.4-mm plywood	0.0084	23 - 74
12.7-mm gypsum board sheathing	0.0091	1373
11-mm oriented strandboard	0.0108	44
11-mm fibreboard sheathing	0.8285	772 - 2465
17-mm wood sheathing	high - depends on no. of joints	982
Insulation		
25-mm foil-faced urethane	negligible	negligible
25-mm extruded polystyrene	negligible	23 - 92
25-mm urethane foam	negligible	69
25-mm phenolic foam	negligible	133
25-mm expanded polystyrene (Type 2)	0.0214	86 - 160
fibrous insulations	very high	very high
Membrane materials		
metal	negligible	negligible
0.15-mm polyethylene	negligible	1.6 - 5.8
breather type sheathing membrane	0.2706	170 - 1400
spun bonded polyolefin film	0.9593	3646
Column 1	2	3

Notes to table A-9.25.1.2.A.:

(1) Air leakage and vapour permeance values derived from:
- Bombaru, D., Jutras, R. and Patenaude, A. Air Permeance of Building Materials. Summary Report prepared by AIR-INS Inc. for Canada Mortgage and Housing Corporation, Ottawa, 1988.
- The Details of Air Barrier Systems for Houses. Ontario New Home Warranty Program, North York, 1993.

A-9.25.2.2.(2) Flame-Spread Ratings of Insulating Materials.

Part 9 has no requirements for flame-spread ratings of insulation materials since these are seldom exposed in parts of buildings where fires are likely to start. Certain of the insulating material standards referenced in Sentence 9.25.2.2.(1) do include flame-spread rating criteria. These are included either because the industry producing the product wishes to demonstrate that their product does not constitute a fire hazard or because the product is regulated by authorities other than building authorities (e.g., Hazardous Products Act). However, the Code cannot apply such requirements to some materials and not to others. Hence, these flame-spread rating requirements are excepted in referencing these standards.

A-9.25.2.3.(3) Position of Insulation.

For thermal insulation to be effective, it must not be short-circuited by convective air flow through or around the material. If low density fibrous insulation is installed with an air space on both sides of the insulation, the temperature differential between the warm and cold sides will drive convective air flow around the insulation. If foam plastic insulation is spot adhered to a back-up wall or adhered in a grid pattern to an air permeable substrate, and is not sealed at the joints and around the perimeter, air spaces between the insulation and the substrate will interconnect with spaces behind the cladding. Any temperature or air pressure differential across the insulation will again lead to short circuiting of the insulation by air flow. Thermal insulation must therefore be installed in full and continuous contact with the air barrier or another continuous component with low air permeance. (See Appendix note A-9.25.3.2. for examples of low-air-permeance materials.)

A-9.25.2.4.(3) Loose-Fill Insulation in Existing Wood Frame Walls.

The addition of insulation into exterior walls of existing wood frame buildings increases the likelihood of damage to framing and cladding components as a result of moisture accumulation. Many older homes were constructed with little or no regard for protection from vapour transmission or air leakage from the interior. Adding thermal insulation will substantially reduce the temperature of the siding or sheathing in winter months, possibly leading to condensation of moisture at this location.

Defects in exterior cladding, flashing and caulking could result in rain entering the wall cavity. This moisture, if retained by the added insulation, could initiate the process of decay.

Steps should be taken therefore, to minimize these effects prior to the retrofit of any insulation. Any openings in walls that could permit leakage of interior heated air into the wall cavity should be sealed. The inside surface should be coated with a low-permeability paint to reduce moisture transfer by diffusion. Finally, the exterior siding, flashing and caulking should be checked and repaired if necessary to prevent rain penetration.

A-9.25.2.4.(5) Loose-Fill Insulation in Masonry Walls.

Typical masonry cavity wall construction techniques do not lend themselves to the prevention of entry of rainwater into the wall space. For this reason, loose-fill insulation used in such space must be of the water repellent type. A test for water-repellency of loose-fill insulation suitable for installation in masonry cavity walls can be found in ASTM C 516, "Vermiculite Loose Fill Insulation".

A-9.25.3.1.(1) Air Barrier Systems for Control of Condensation.

The majority of moisture problems resulting from condensation of water vapour in walls and ceiling/attic spaces are caused by the leakage of moist interior heated air into these spaces rather than by the diffusion of water vapour through the building envelope.

Protection against such air leakage must be provided by a system of air-impermeable materials joined with leak-free joints. Generally, air leakage protection can be provided by the use of air-impermeable sheet materials, such as gypsum board or polyethylene of sufficient thickness, when installed with appropriate structural support. However, the integrity of the airtight elements in the air barrier system can be compromised at the joints and here special care must be taken in design and construction to achieve an effective air barrier system.

Although Section 9.25. refers separately to vapour barriers and airtight elements in the air barrier system, these functions in a wall or ceiling assembly of conventional wood frame construction are often combined as a single membrane which acts as a barrier against moisture diffusion and the movement of interior air into insulated wall or roof cavities. Openings cut through this membrane, such as for electrical boxes, provide opportunities for air leakage into concealed spaces, and special measures must be taken to make such openings as airtight as possible. Attention must also be paid to less obvious leakage paths, such as holes for electric wiring, plumbing installations, wall-ceiling and wall-floor intersections, and gaps created by shrinkage of framing members.

In any case, air leakage must be controlled to a level where the occurrence of condensation will be sufficiently rare, or the quantities accumulated sufficiently small, and drying sufficiently rapid, to avoid material deterioration and the growth of mould and fungi.

Generally the location in a building assembly of the airtight element of the air barrier system is not critical; it can restrict air leakage whether it is located near the outer surface of the assembly, near the inner surface or at some intermediate location. However, if a material chosen to act as an airtight element in the air barrier system also has the characteristics of a vapour barrier (i.e., low permeability to water vapour), its location must be chosen more carefully in order to avoid moisture problems. (See Appendix notes A-9.25.1.2. and A-9.25.4.2.(2))

In some assemblies, an airtight element in the air barrier system is the interior finish, such as gypsum board, which is sealed to framing members and adjacent components by gaskets, caulking, tape or other methods to complete the air barrier system. In such cases, special care in sealing joints in a separate vapour barrier is not critical. This approach often uses no separate vapour barrier but relies on appropriate paint coatings to give the interior finish sufficient resistance to water vapour diffusion that it can provide the required vapour diffusion protection.

Section 9.25. allows for such innovative techniques, as well as the more traditional approach of using a continuous sheet, such as polyethylene, to act as an "air/vapour barrier."

Further information is available in "Moisture Problems in Houses," by A.T. Hansen, Canadian Building Digest 231, available from the Institute for Research in Construction, National Research Council of Canada, Ottawa K1A 0R6.

A-9.25.3.2. Air Barrier System Properties.

Materials which have been tested and are considered to have low air permeance include:

- 2 mm smooth surface roofing membrane
- 2.7 mm modified bituminous torch-on membranes
- 1.3 mm modified bituminous self-adhesive membranes
- 12.7 mm gypsum board
- 12.7 mm cement board
- 8 mm plywood
- 12.7 mm particle board
- 11 mm waferboard
- 3.2 mm tempered hardboard
- 38 mm extruded polystyrene
- 25.4 mm foil back urethane insulation
- 24 mm phenolic insulation board
- aluminum foil
- polyethylene sheet
- reinforced non-perforated polyolefin.

A-9.25.4.2.(2) Increased Vapour Diffusion Resistance.

Sentence 9.25.4.2.(2) indicates that where other elements in the building assembly have low vapour permeance, the vapour permeance of the element identified as the vapour barrier must be further reduced. As discussed in Appendix note A-9.25.1.2., the location or installation of elements with low air permeance and low vapour permeance requires special consideration to avoid moisture related deterioration. The following provides additional information on a variety of elements in the building assembly which may have low vapour permeance and thereby either perform as the vapour barrier or whose presence may demand more stringent requirements for the element identified as the vapour barrier.

A-9.25.4.3.(2) Location of Vapour Barriers.

Assemblies in which the vapour barrier is located partway through the insulation meet the intent of this Article provided it can be shown that the temperature of the vapour barrier will not fall below the dew point of the heated interior air.

A-9.26.1.1.(2) Platforms that Effectively Serve as Roofs.

Decks, balconies, exterior walkways and similar exterior surfaces effectively serve as roofs where these platforms do not permit the free drainage of water through the deck. Unless the surface slopes to the outside edges and water can freely drain over the edge, water will pond on the surface. When rain is driven across the deck (roof) surface, water will move upward when it encounters an interruption.

A-9.26.2.2.(4) Fasteners for Treated Shingles.

Where shingles or shakes have been chemically treated with a preservative or a fire retardant, the fastener should be of a material known to be compatible with the chemicals used in the treatment.

A-9.26.4.1. Junctions between Roofs and Walls or Guards.

Drainage of water from decks and other platforms that effectively serve as roofs will be blocked by walls, and blocked or restricted by guards where significant lengths and heights of material are connected to the deck. Without proper flashing at such roof-wall junctions or roof-guard junctions, water will generally leak into the adjoining elements and can penetrate into supporting assemblies below. Exceptions include platforms where waterproof curbs of sufficient height are cast-in or where the deck and wall or guard are unit-formed. In these cases, the monolithic deck-wall or deck-guard junctions will minimize the likelihood of water ingress. (See also Appendix Note A-9.26.1.1.(2).)

A-9.26.6.1.(1) Underlay Beneath Shingles.

While underlayment has not traditionally been required by the Code, some shingle manufacturers require its use beneath their product.

A-9.26.17.1.(1) Installation of Concrete Roof Tiles.

Where concrete roof tiles are to be installed, the dead load imposed by this material should be considered in determining the minimum sizes and maximum spans of the supporting roof members.

A-9.27.2. Required Protection from Precipitation.

Part 5 and Part 9 of the Building Code recognize that mass walls and face-sealed, concealed barrier and rainscreen assemblies have their place in the Canadian context. Mass walls are generally constructed of cast-in-place concrete or masonry. Without cladding or surface finish, they can be exposed to precipitation for a significant period before moisture will penetrate from the exterior to the interior. The critical characteristics of these walls are related to thickness, mass, and moisture transfer properties, such as shedding, absorption and moisture diffusion.

Face-sealed assemblies have only a single plane of protection. Sealant installed between cladding elements and other envelope components is part of the air barrier system and is exposed to the weather. Face-sealed assemblies are appropriate where it can be demonstrated that they will provide acceptable performance with respect to the health and safety of the occupants, the operation of building services and the provision of conditions suitable for the intended occupancy. These assemblies, however, require more intensive, regular and on-going maintenance, and should only be selected on the basis of life-cycle costing considering the risk of failure and all implications should failure occur. Climate loads such as wind-driven rain, for example, should be considered. Face-sealed assemblies are not recommended where the building owner may not be aware of the maintenance issue or where regular maintenance may be problematic.

Concealed barrier assemblies include both a first and second plane of protection. The first plane comprises the cladding, which is intended to handle the majority of the precipitation load. The second plane of protection is intended to handle any water that penetrates the cladding plane. It allows for the dissipation of this water, primarily by gravity drainage, and provides a barrier to further ingress.

Like concealed barrier assemblies, rainscreen assemblies include both a first and second plane of protection. The first plane comprises the cladding, which is designed and constructed to handle virtually all of the precipitation load. The second plane of protection is designed and constructed to handle only very small quantities of incidental water; composition of the second plane is described in Appendix Note A-9.27.3.1. In these assemblies, the air barrier system, which plays a role in controlling precipitation ingress due to air pressure difference, is protected from the elements. (See Figure A-9.27.2.)

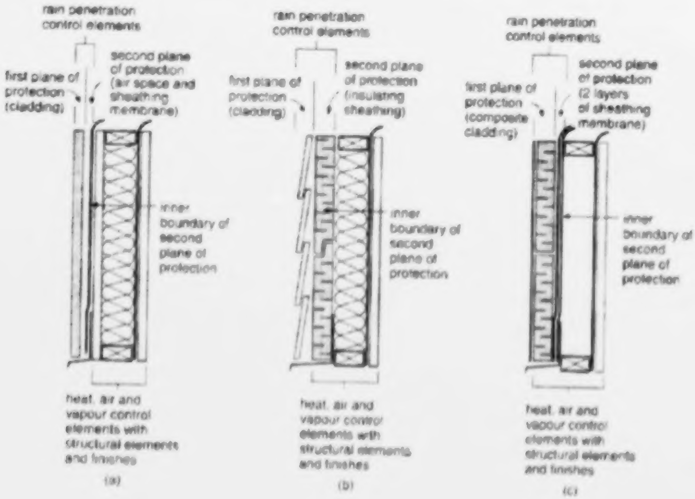

rain penetration control elements
second plane of protection (air space and sheathing membrane)
first plane of protection (cladding)
inner boundary of second plane of protection
heat, air and vapour control elements with structural elements and finishes
(a)
rain penetration control elements
second plane of protection (insulating sheathing)
first plane of protection (cladding)
inner boundary of second plane of protection
heat, air and vapour control elements with structural elements and finishes
(b)
rain penetration control elements
second plane of protection (2 layers of sheathing membrane)
first plane of protection (composite cladding)
inner boundary of second plane of protection
heat, air and vapour control elements with structural elements and finishes
(c)

Figure A-9.27.2.
Generic Rainscreen Assemblies

A-9.27.2.1.(1) Minimizing Precipitation Ingress.

The total prevention of precipitation ingress into wall assemblies is difficult to achieve and, depending on the wall design and construction, may not be absolutely necessary. The amount of moisture that enters a wall, and the frequency with which this occurs, must be limited. The occurrence of ingress must be sufficiently rare, accumulation sufficiently small and drying sufficiently rapid to prevent the deterioration of moisture-susceptible materials and the growth of fungi.

A-9.27.2.2. Required Levels of Protection from Precipitation.

All previous editions of Part 9 of the Code included a performance-based provision requiring that cladding provide protection from the weather for inboard materials.

In response to requests from industry, Part 9 now provides additional guidance to assist in determining the minimum levels of protection from precipitation to be provided by cladding assemblies. As with all requirements in the Code, the new requirements in Article 9.27.2.2. describe the minimum cladding assembly configuration. Designers must still consider local accepted good practice, demonstrated performance and the specific conditions to which a particular wall will be exposed when designing or selecting a cladding assembly.

A.9.27.3.1. Second Plane of Protection.

As specified in Sentence 9.27.3.1.(1), the second plane of protection consists of a drainage plane with an appropriate material serving as the inner boundary and flashing to dissipate rainwater or meltwater to the exterior.

Drainage Plane

Except for masonry walls, the simplest configuration of a drainage plane is merely a vertical interface between materials that will allow gravity to draw the moisture down to the flashing to allow it to dissipate to the exterior. It does not necessarily need to be constructed as a clear drainage space (air space).

For masonry walls, an open rainscreen assembly is required; that is, an assembly with first and second planes of protection where the drainage plane is constructed as a drained and vented air space. Such construction also constitutes best practice for walls other than masonry walls.

Section 9.20. requires drainage spaces of 25 mm for masonry veneer walls and 50 mm for cavity walls. In other than masonry walls, the drainage space in an open rainscreen assembly should be at least 10 mm deep. Drainage holes must be designed in conjunction with the flashing.

Sheathing Membrane

The sheathing membrane described in Article 9.27.3.2. is not a waterproof material. When installed to serve as the inner boundary of the second plane of protection, and when that plane of protection includes a drainage space at least 10 mm deep, the performance of the identified sheathing membrane has been demonstrated to be adequate. This is because the material is expected to have to handle only a very small quantity of water that penetrates the first plane of protection.

If the 10 mm drainage space is reduced or interrupted, the drainage capacity and the capillary break provided by the space will be reduced. In these cases, the material selected to serve as the inner boundary may need to be upgraded to provide greater water resistance in order to protect moisture-susceptible materials in the backing wall.

Appropriate Level of Protection

It is recognized that many cladding assemblies with no space or with discontinuous space behind the cladding, and with the sheathing membrane material identified in Article 9.27.3.2., have provided acceptable performance with a range of precipitation loads imposed on them. Vinyl and metal strip siding, and shake and shingle cladding, for example, are installed with discontinuous drained spaces, and have demonstrated acceptable performance in most conditions. Lapped wood and composite strip sidings, depending on their profiles, may or may not provide discontinuous spaces, and generally provide little drainage. Cladding assemblies with limited drainage capability that use a sheathing membrane meeting the minimum requirements are not recommended where they may be exposed to high precipitation loads or where the level of protection provided by the cladding is unknown or questionable. Local practice with demonstrated performance should be considered. (See also Article 9.27.2.2. and Appendix Note A-9.27.2.2.)

A-9.27.3.4.(2) Detailing of Joints in Exterior Insulating Sheathing.

The shape of a joint is critical to its ability to shed water. Tongue and groove, and lapped joints can shed water if oriented correctly. Butt joints can drain to either side and so should not be used unless they are sealed. However, detailing of joints requires attention not just to the shape of the joint but also to the materials that form the joint. For example, even if properly shaped, the joints in insulating sheathing with an integral sheathing membrane could not be expected to shed water if the insulating material absorbs water, unless the membrane extends through the joints.

A-9.27.3.5.(1) Sheathing Membranes in lieu of Sheathing.

Article 9.23.16.1., Required Sheathing, indicates that sheathing must be installed only where the cladding requires intermediate fastening between supports (studs) or where the cladding requires a solid backing. Cladding such as brick or panels would be exempt from this requirement and in these cases a double layer of sheathing membrane would generally be needed. The exception (Article 9.27.3.6.) applies only to those types of cladding that provide a face seal to the weather.

A-9.27.3.6. Sheathing Membrane under Face Sealed Cladding.

The purpose of sheathing membrane on walls is to reduce air infiltration and to control the entry of wind-driven rain. Certain types of cladding consisting of very large sheets or panels with well-sealed joints will perform this function, eliminating the need for sheathing membrane. This is true of the metal cladding with lock-seamed joints sometimes used on mobile homes. However, it does not apply to metal or plastic siding applied in narrow strips which is intended to simulate the appearance of lapped wood siding. Such material does not act as a substitute for sheathing membrane since it incorporates provision for venting the wall cavity and has many loosely-fitted joints which cannot be counted on to prevent the entry of wind and rain.

Furthermore, certain types of sheathing systems can perform the function of the sheathing membrane. Where it can be demonstrated that a sheathing material is at least as impervious to air and water penetration as sheathing membrane and that its jointing system results in joints that are at least as impervious to air and water penetration as the material itself, sheathing membrane may be omitted.

A-9.27.3.8.(1) Required Flashing.

Horizontal Offsets

Where a horizontal offset in the cladding is provided by a single cladding element, there is no joint between the offset and the cladding above. In this case, and provided the cladding material on the offset provides effective protection for the construction below, flashing is not required.

Changes in Substrate

In certain situations, flashing should be installed at a change of substrate: for example, where stucco cladding is installed on a wood-frame assembly, extending down over a masonry or cast-in-place concrete foundation and applied directly to it. Such an application does not take into account the potential for shrinkage of the wood frame and cuts off the drainage route for moisture that may accumulate behind the stucco on the frame construction.

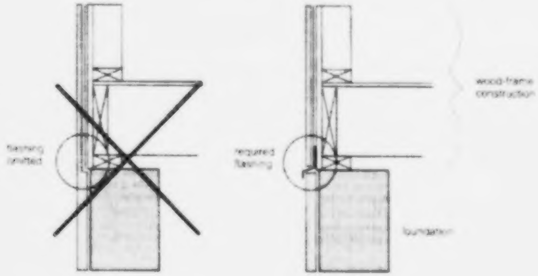


Figure A-9.27.3.8.(1)
Flashing at Change in Substrate

A.9.27.3.8.(3) Flashing over Curved-Head Openings.

The requirement for flashing over openings depends on the vertical distance from the top of the trim over the opening to the bottom of the eave compared to the horizontal projection of the eave. In the case of curved-head openings, the vertical distance from the top of the trim increases as one moves away from the centre of the opening. For these openings, the top of the trim must be taken as the lowest height before the trim becomes vertical. (See Figure A-9.27.3.8.(3).)

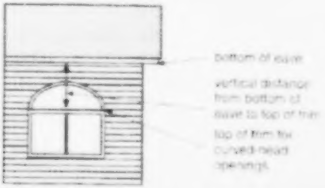

bottom of eave
vertical distance from bottom of eave to top of trim
top of trim for curved-head openings

Figure A-9.27.3.8.(3)
Flashing over Curved-head Openings

A-9.27.3.8.(4) Flashing Configuration and Positive Drainage.

Flashing Configuration

A 6% slope is recognized as the minimum that will provide effective flashing drainage. The 10 mm vertical lap over the building element below and the 5 mm offset are prescribed to reduce transfer by capillarity and surface tension. Figure A-9.27.3.8.(4) illustrates two examples of flashing configurations.

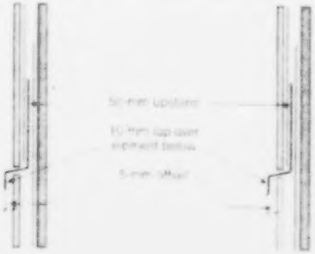


Figure A-9.27.3.8.(4)
Examples of Flashing Configurations Showing Upstands, Horizontal Offsets and Vertical Laps

Maintaining Positive Slope

Sentence 9.27.3.8.(4) requires that the minimum 6% flashing slope remain after expected shrinkage of the building frame. Similarly, Sentence 9.26.3.1.(4) requires that a positive slope remain on roofs and similar assemblies after expected shrinkage of the building frame.

For Part 9 wood-frame constructions, expected wood shrinkage can be determined based on the average equilibrium moisture content (MC) of wood, within the building envelope assembly. According the the Canadian Wood Council's Wood Reference Handbook, the equilibrium moisture content (equilibrium MC) for wood in Ontario is 8%.

For three-storey constructions to which Part 9 applies, the cumulative longitudinal shrinkage is negligible. Shrinkage need only be calculated for horizontal framing members using the following formula (from Introduction to Wood Building Technology, Canadian Wood Council, Ottawa, 1997):

Shrinkage = (total horizontal member height) x (initial MC - equilibrium MC) x (.002)

A-9.27.3.8.(5) Protection against Precipitation Ingress at the Sill-to-Cladding Joint.

Many windows are configured in such a way that a line of sealant is the only protection against water ingress at the sill-to-cladding joint-a location that is exposed to all of the water that flows down the window. In the past, many windows were constructed with self-flashing sills-sills that extend beyond the face of the cladding and have a drip on the underside to divert water away from the sill-to-cladding joint. This sill configuration was considered to be accepted good practice and is recognized today as providing a degree of redundancy in precipitation protection.

Self-flashing sills are sills that

- slope toward the exterior where the sills have an upward facing surface that extends beyond the jambs,
- where installed over a masonry sill, extend not less than 25 mm beyond the inner face of that sill,
- incorporate a drip positioned not less than 5 mm outward from the outer face of the cladding below or not less than 15 mm beyond the inner edge of a masonry sill, and
- terminate at the jambs or, where the face of the jambs is not at least flush with the face of the cladding and the sills extend beyond the jambs, incorporate end dams sufficiently high to protect against overflow in wind-driven rain conditions.

A wind pressure of 10 Pa can raise water 1 mm. Thus, for example, if a window is exposed to a driving rain wind pressure of 200 Pa, end dams should be at least 20 mm high.

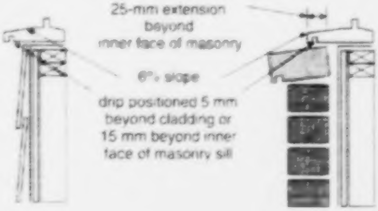

25-mm extension beyond inner face of masonry
6% slope
drip positioned 5 mm beyond cladding or 15 mm beyond inner face of masonry sill

Figure A-9.27.3.8.(5)
Examples of Configurations of Self-flashing Sills

A-9.27.3.8.(6) Exterior-Mounted Windows and Doors.

This provision applies to flanged windows or doors installed on the exterior of essentially flat, lock-seam metal cladding, such as the ones once used on small factory-built buildings.

A-9.27.10.2.(3) Grooves in Hardboard Cladding.

Grooves deeper than that specified may be used in thicker cladding providing they do not reduce the thickness to less than the required thickness minus 1.5 mm. Thus for type 1 or 2 cladding, grooves must not reduce the thickness to less than 4.5 mm or 6 mm depending on method of support, or to less than 7.5 mm for type 5 material.

A-9.27.11.2.(2) Thickness of Grade O-2 OSB.

In using Table 9.27.9.2. to determine the thickness of Grade O-2 OSB cladding, substitute "face orientation" for "face grain" in the column headings.

A-9.27.1 2.1.(3) and (4) Material Standards for Aluminum Cladding.

Compliance with Sentence 9.27.12.1.(3) and CAN/CGSB-93.2-M, "Prefinished Aluminum Siding, Soffits, and Fascia for Residential Use," is required for aluminum siding that is installed in horizontal or vertical strips. Compliance with Sentence 9.27.12.1.(4) and CAN/CGSB-93.1-M, "Sheet, Aluminum Alloy, Prefinished, Residential," is required for aluminum cladding that is installed in large sheets.

A-Table 9.28.4.3. Stucco Lath.

Paper-backed welded wire lath may also be used on horizontal surfaces provided its characteristics are suitable for such application.

A-9.30.1.2.(1) Water Resistance.

In some areas of buildings, water and other substances may frequently be splashed or spilled onto the floor. It is preferable, in such areas, that the finish flooring be a type that will not absorb moisture or permit it to pass through; otherwise, both the flooring itself and the subfloor beneath it may deteriorate. Also, particularly in food preparation areas and bathrooms, unsanitary conditions may be created by the absorbed moisture. Where absorbent or permeable flooring materials are used in these areas, they should be installed in such a way that they can be conveniently removed periodically for cleaning or replacement, i.e., they should not be glued or nailed down. Also, if the subfloor is a type that is susceptible to moisture damage (this includes virtually all of the wood-based subfloor materials used in wood frame construction), it should be protected by an impermeable membrane placed between the finish flooring and the subfloor. The minimum degree of impermeability required by Sentence 9.30.1.2.(1) would be provided by such materials as polyethylene, aluminum foil, and most single-ply roofing membranes (EPDM, PVC).

A-9.31.6.3.(3) Securement of Service Water Heaters.

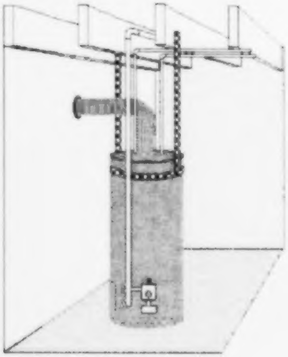


Figure A-9.31.6.3.
Securement of Service Water Heater Using Strapping Fastened to Floor Joists Overhead

A-9.32.3. Mechanical Ventilation.

For many years, houses were constructed without mechanical ventilation systems and relied on natural air leakage through the building envelope for winter ventilation. However, houses have become progressively more airtight through the introduction of new products and practices, e.g., the substitution of panel sheathings such as plywood and waferboard for board sheathing, the replacement of paper-backed insulation batts with friction-fit batts and polyethylene film, improved caulking materials, tighter windows and doors, and more efficient heating systems. Following the energy crisis in the early 1970's, considerable emphasis was placed on reducing air leakage in order to conserve energy. Electric heating systems were encouraged and higher efficiency furnaces were developed, which further reduced air change rates in buildings. This led to concern that the natural air change in dwelling units might be insufficient in some instances to provide adequate indoor air quality. Condensation problems resulting from higher humidity levels were also a concern.

Mechanical ventilation requirements in the Building Code have evolved from a simple requirement in the 1980 edition that exhaust fans be incorporated in electrically heated houses, through requirements in the 1985 and 1990 editions that all houses have mechanical ventilation systems capable of exchanging the indoor air for outdoor air at a specified rate: 0.5 air changes per hour in the 1986 edition and 0.3 air changes per hour in the 1990 edition. The current requirements address not only the overall air change rate created by the mechanical ventilation system but also the need to ensure that the outdoor air brought into the house by the system is distributed throughout the house.

A-9.33.1.1. Combustion Air and Tight Houses.

The operation of an air exhaust system or of a fuel-burning appliance removes the air from a house, creating a slight negative pressure inside. In certain cases the natural flow of air up a chimney can be reversed, leading to a possible danger of carbon monoxide poisoning for the inhabitants.

Newer houses are generally more tightly constructed than older ones because of improved construction practices, including tighter windows, weather stripping and caulking. This fact increases the probability that infiltration may not be able to supply enough air to compensate for simultaneous operation of exhaust fans, fireplaces, clothes dryers, furnaces and space heaters. It is necessary, therefore, to introduce outside air to the space containing the fuel-burning appliance. Information regarding combustion air requirements for various types of appliances can be found in the installation standards referenced in Articles 6.2.1.4. and 9.33.1.2. In the case of solid-fuel burning stoves, ranges and space heaters, CAN/CSA B365-M87 suggests that the minimum size of openings be determined by trial and error to accommodate the flue characteristics, the firing rate, the building characteristics, etc., and that, as a guide, the combustion air opening should be 0.5 times the flue collar area.

Further information is available in Canadian Building Digest 222, "Airtight Houses and Carbon Monoxide Poisoning," from the Institute for Research in Construction, National Research Council of Canada, Ottawa K1A 0R6.

A-9.33.1.2. Design, Construction and Installation Standard for Solid-Fuel-Burning Appliances.

Standard CAN/CSA-B365 is essentially an installation standard, and covers such issues as accessibility, air for combustion and ventilation, chimney and venting, mounting and floor protection, wall and ceiling clearances, installation of ducts, pipes, thimbles and manifolds, and control and safety devices. But the standard also includes a requirement that solid-fuel-burning appliances and equipment satisfy the requirements of one of a series of standards, depending on the appliance or equipment, therefore also making it a design and construction standard. It is required that stoves, ranges, central furnaces and other space heaters be designed and built in conformity with the relevant referenced standard.

A-9.33.4. Carbon Monoxide Alarms.

Carbon monoxide (CO) is a colourless, odourless gas that can build up to lethal concentrations in an enclosed space without the occupants being aware of it. Thus, where an enclosed space incorporates or is near a potential source of CO, it is prudent to provide some means of detecting its presence.

Dwelling units have two common potential sources of CO:

- fuel-fired space- or water-heating equipment within the dwelling unit or in adjacent spaces within the building, and
- attached storage garages.

Most fuel-fired heating appliances do not normally produce CO and, even if they do, it is normally conveyed outside the building by the appliance's venting system. Nevertheless, appliances can malfunction and venting systems can fail. Therefore, the provision of appropriately placed CO alarms in the dwelling unit is a relatively low-cost back-up safety measure. Similarly, although Article 9.10.9.16. requires that the walls and floor/ceiling assemblies separating attached garages from dwelling units incorporate an air barrier system, there have been several instances of CO from garages being drawn into houses, which indicates that a fully gas-tight barrier is difficult to achieve. The likelihood of preventing the entry of all CO is decreased if the dwelling unit is depressurized in relation to the garage. This can readily occur due to the operation of exhaust equipment or simply due to the stack effect created by heating the dwelling unit. Again, CO alarms in the dwelling unit provide a relatively low-cost back-up safety measure.

A-9.40. Cold Room Slabs.

Design Assumptions

1. Density of Reinforced Concrete = 23.5 kN/m^3.

2. Live Loads - As per Sentence 9.4.2.3 (1) of the Building Code, the live load is the lesser of the following:
   - 1.9 kPa,
   - Specified roof snow load, which for Ontario is up to 2.9 kPa.

   Therefore a specified design load of 3.0 kPa is appropriate; however, the slab specified is capable of carrying higher live loads since the crack control requirements of CSA A23.3 and cover requirements as given below govern the design of the slab.

3. Design Standards: CSA A23.3-94, "Design of Concrete Structures".

4. Exposure and Cover for Reinforcing Steel:
   - The slab is considered to be exposed to weather and de-icing chemicals.
   - Minimum top cover is 60 mm as per CSA A23.3 Clause A15.1.7.1 plus a 12 mm tolerance on placement.
   - Minimum bottom cover is 30 mm as per CSA A23.3 Clause A12.6.2 (slab cast against formwork).
   - For 10M reinforcing bars the minimum slab thickness is 72 mm cover + 11.3 mm bar + 11.3 mm bar + 30 mm cover = 125 mm.

5. Design Assumptions:
   - Concrete compressive strength of 32 MPa at 28 days as per Sentence 9.3.1.6 (1) of the Building Code.
   - Reinforcing steel yield strength of 400 MPa.
   - Slab design is based on a one-way slab simply supported on foundation walls along the edges. Since the slab can be square or rectangular, the same steel is provided in both directions.
   - Maximum span is limited to 20 times the slab thickness as per CSA A23.3 Table 9.1.

A-10 Change of Use.

The successful application of Code requirements to a change of use of an existing building or parts thereof without any proposed construction becomes a matter of balancing the cost of implementing a requirement with the relative importance of that requirement to the overall Code objectives. In general, the degree to which any particular requirement can be relaxed without affecting the intended level of safety of the Code requires considerable judgment on the part of both the designer and the authority having jurisdiction. Therefore, this Part sets out a minimum performance level which the change of use must maintain.

A-11.2.1.1.(1)(a) Construction Index.

The scale of 1 (lowest) to 8 (highest) was formulated for existing buildings, to be used to determine their existing performance level; the numbers, or indices, were established based on the requirements of 3.2.2.20. to 3.2.2.83. Classification of existing buildings will now be in accord with Table 11.2.1.1.A. rather than Subsection 3.2.2. The construction index is established by evaluating all floors and roofs of the existing building.

A-11.2.1.1.(1)(b) Hazard Index.

While the construction index refers to construction of the existing building, hazard index refers to the proposed major occupancy or use of the building; the scales of 1 (lowest hazard) to 8 (highest hazard) are compatible with those of the construction index. In effect, a building with a C.I. of say 3, will support a major occupancy with a H.I. of 3 or lower; if you wish to change to a major occupancy with a H.I. higher than 3, then you must increase the fire protection construction of the building to support that higher hazard according to Table 11.2.1.1.A., or provide the additional upgrading in accordance with Column 4 of Table 11.4.3.4.A.

A-11.3.1.1. Performance Level.

States the philosophy and intent of this Article: "after construction, the performance level of the building may remain the same, or be made better, but may not be made worse".

A-11.3.1.2. New and Extension of Existing Building System.

Generally, new or extended building systems should follow the Code for new construction, and where necessary, may seek some relief through compliance alternatives, alternative measures or match existing.

A-11.3.3.1. Basic Renovation.

The basic renovation is the simplest form of renovation: the work area is limited in size (within a suite or room), and does not involve a decrease in performance level of the building. The limit in size assures that accesses to exits, corridor separations, or other life safety systems are left intact, where less than a full floor area is under renovation.

A-11.3.3.2. Extensive Renovation.

In cases where extensive renovation of the building is proposed, there is generally no reason why the new systems should not comply with new construction requirements; in this case the applicant may seek relief only through "alternative measures", should a construction difficulty arise that requires such relief. This would apply to the substantial renovation of the entire building.

A-11.4.3.1. Compensating Construction.

Where the performance level of the building or part of the building is reduced through Subsection 11.4.2., compensating construction will be required to restore the performance level to its former state, of the early warning and evacuation systems, the fire and structural protection construction of the building. The amount of upgrading required depends on the results of a performance level evaluation.

The extent, or areas covered, of this upgrading include the protection of the surrounding existing areas from the portion being renovated, and the means of egress from the building if adversely affected by the renovation.

A-11.4.3.2. Structural.

Provides, subject to any of three conditions, for adequacy of support for floors that will be receiving increased dead or live loads: options are restriction of loads, or upgrading of support systems.

A-11.4.3.3. Increase in Occupant Load.

Where the increase is greater than 15%, and construction takes place, the performance level is reduced and must be restored as required in Table 11.4.3.3.

Where the increase is 15% or less, and construction takes place, the performance level is reduced. Where the new occupant load is more than 15% above the exit capacity or for which a fire alarm system is required. The performance level must be restored as required by Table 11.4.3.3.

Smaller buildings, of 14 persons or less in boarding houses, and 16 persons or less in dwelling units, are exempt.

A-11.4.3.4. Change in Major Occupancy.

Provided construction takes place, a change in major occupancy to one of a greater hazard index reduces the performance level. An increase of the hazard index will trigger the classification of the entire building as to its construction index and hazard index under Table 11.4.3.3., Table 11.4.3.4.A. and B. to determine what upgrading, if any is required to ensure that the building will support that new hazard.

A-11.5.1. Compliance Alternative.

Subsection 11.5.1. allows compliance alternatives to be used, in lieu of certain requirements in other Parts of Division B. Alternatives to requirements in Part 3, 4, or 6 may be used subject to the chief official's satisfaction, while alternatives to Part 9 requirements are not subject to this condition.

Explanatory Material for Division C

A-1.2.1.1.(3) Requirement for an Architect.

This Sentence permits an exception to the requirement for an architect in any building in Table 1.2.1.1. This exception applies only where the design for the interior space and related exterior elements comply with this Code.

A-1.3.6.1. As Constructed Plans.

The intent of the provision for as constructed plans is to provide the municipality with authority to ask for information that is necessary for the enforcement of the Act and the Building Code. The intent of the provision is not to duplicate the permit approval process and require similar information to be filed upon completion of the project. Similarly, the provision is not intended to require information and documentation beyond those that are normally generated in the building permit approval process.

Appendix B

Imperial Conversions of Metric Values

Imperial conversions may be determined using the factors listed below.

Conversion Factors		
to Convert	**to**	**Multiply by**
°C	°F	1.8 and add 32
g	oz	0.0353
g	lb	0.0022
kg	lb	2.2046
kg/m^2	lb/ft^2	0.20481
kPa	lb/in^2	0.14503
kPa	lb/ft2	20.885
L	gal (Imp)	0.21997
L	gal (US)	0.26417
L/m^2	gal/ft^2 (Imp)	0.02044
L/s*	gal/min (Imp)	13.198
L/s*	gal/min (US)	15.850
L/s**	ft^3/min	2.1189
L/s•m	cfm/ft	0.64584
L/s•m^2	cfm/ft^2	0.19685
lx	ft-candle	0.09290
mm	in	0.03937
m	ft	3.2808
m^2	ft^2	10.764
m^3	ft^3	35.315
m^3/h	ft^3/min	0.58857
m/s	ft/min	196.85
MJ	Btu	947.82
m^2•°C/W (RSI)	ft^2•h•°F/Btu (R)	5.6785
N	lbf	0.22481
ng/Pa•s•m^2	perms	0.01741
W	Btu/h	3.4122
Column 1	2	3

Notes:

- * liquid volume flowrate
- ** air volume flowrate

SI Units and their Multiples

The SI prefixes used to form names and symbols of decimal multiples and sub-multiples of SI units are:

Prefix	Symbol	Magnitude	Factor
exa	E	1 000 000 000 000 000 000	10^{18}
peta	P	1 000 000 000 000 000	10^{15}
tera	T	1 000 000 000 000	10^{12}
giga[1]	G	1 000 000 000	10^{9}
mega[1]	M	1 000 000	10^{6}
kilo[1]	k	1 000	10^{3}
hecto[2]	h	100	10^{2}
deca[2]	da	10	10^{1}
deci[2]	d	0.1	10^{-1}
centi[2]	c	0.01	10^{-2}
milli[1]	m	0.001	10^{-3}
micro[1]	µ	0.000 001	10^{-6}
nano[1]	n	0.000 000 001	10^{-9}
pico	p	0.000 000 000 001	10^{-12}
femto	f	0.000 000 000 000 001	10^{-15}
atto	a	0.000 000 000 000 000 001	10^{-18}
Column 1	2	3	4

Notes:

(1) most frequently used

(2) avoid if possible

Conversion Table for SI Units used in Division B

Imperial equivalent values are given for SI units in Part 9 of Division B.
The following Tables list conversions for SI units used in all other Parts of Division B.

Length

SI Units, mm	Imperial Units, in
0.254	0.010
0.3	0.012
0.33	0.013
0.35	0.014
0.38	0.015
0.41	0.016
0.48	0.019
0.61	0.024
0.7	0.028
1	0.039
1.8	0.071
2.16	0.085
2.4	0.095
2.89	0.114
3	0.118
3.67	0.145
5	0.197
5.5	0.217
6	0.236
6.1	0.240
7	0.276
8	0.315
9.2	0.362
9.5	0.374
10	0.394
11	0.433
12	0.472
12.5	0.492
12.7	0.500
13	0.512
15	0.591
15.9	0.626
18	0.709
18.4	0.724
19	0.748
25	0.984
28	1.102
30	1.181
38	1.496
40	1.575
43	1.693
45	1.772
50	1.969
57	2.244
60	2.362
64	2.52
65	2.559
75	2.953
89	3.504
100	3.937
110	4.331
114	4.488
125	4.921
130	5.118
140	5.512
150	5.906
152	5.984
155	6.102
175	6.890
180	7.087
190	7.480
191	7.520
200	7.874
210	8.268
220	8.661
228	8.976
230	9.055
240	9.449
241	9.488
250	9.843
255	10.039
280	11.024
300	11.811
350	13.780
355	13.976
375	14.764
380	14.961

SI Units, mm	Imperial Units, in
400	15.748
430	16.929
450	17.717
460	18.110
480	18.898
485	19.095
500	19.685
550	21.654
600	23.622
610	24.016
660	25.984
680	26.772
685	26.969
735	28.937
750	29.528
760	29.921
790	31.102
800	31.496
810	31.890
840	33.071
850	33.465
865	34.055
900	35.433
914	35.984
915	36.024
920	36.221
965	37.992
1000	39.370
1020	3.346
1050	3.445
1060	3.478
1070	3.511
1100	3.609
1200	3.937
1220	4.003
1350	4.429
1400	4.593
1500	4.921
1525	5.003
1600	5.249
1650	5.413
1670	5.479
1700	5.577
1750	5.741

SI Units, mm	Imperial Units, ft
1800	5.905
1950	6.398
1980	6.496
2000	6.561
2010	6.594
2030	6.660
2050	6.726
2100	6.890
2200	7.218
2300	7.546
2400	7.874
2440	8.005
2500	8.202
2750	9.022
SI Units, m	Imperial Units, ft
3.0	9.842
3.2	10.499
3.5	11.483
3.6	11.811
3.65	11.975
3.7	12.139
3.75	12.303
4.0	13.123
4.25	13.943
4.5	14.764
5.0	16.404
6.0	19.685
6.4	20.997
7.0	22.966
7.5	24.606
8.0	26.246
9.0	29.527
10.0	32.808
12.0	39.370
14.0	45.931
15.0	49.212
18.0	59.054
20.0	65.616
22.0	72.178
24.0	78.739
25.0	82.021
30.0	98.424
36.0	118.109
40.0	131.232

45.0	147.636
50.0	164.042
60.0	196.848
70.0	229.656
75.0	246.063
84.0	275.587
90.0	295.272
100.0	328.084
105.0	344.488
120.0	393.701
150.0	492.126
200.0	656.168

Area

SI Units, m^2	Imperial, ft^2
0.013	0.140
0.016	0.172
0.065	0.694
0.093	1.001
0.1	1.076
0.2	2.153
0.3	3.229
0.4	4.306
0.5	5.382
0.6	6.458
0.75	8.073
0.8	8.611
0.93	10.011
0.95	10.226
1	10.764
1.1	11.840
1.5	16.146
1.85	19.913
2	21.528
2.2	23.681
2.3	24.757
2.5	26.910
2.79	30.031
2.8	30.139
3.7	39.827
3.72	40.042
4.5	48.438
4.6	49.514
4.7	50.591
5.6	60.278
6	64.584
7	75.348
9	96.876
9.3	100.105
10	107.640
10.22	110.008
11	118.404
11.6	124.862
12	129.168
14	150.696
15	161.459
16.72	179.974
20	215.278
22	236.808
25	269.098
25.08	269.961
27	290.628
28	301.392
29.73	320.014
30	322.92
40	430.56
46	495.14
50	538.20
56	602.78
60	645.84
65	699.66
80	861.12
100	1076.40
150	1614.59
200	2152.79
225	2421.88
230	2475.72
240	2583.36
250	2691.0
300	3229.2
350	3767.4
400	4305.6
500	5382.0
600	6458.4
750	8073.0
800	8611.2
900	9687.6
1000	10764.0
1070	11517.4
1125	12109.4

1200	12917
1250	13455
1340	14424
1350	14531
1400	15070
1500	16146
1600	17222
1800	19375
1875	20183
2000	21528
2250	24219
2400	25834
2500	26910
2700	29063
2800	30139
2810	30247
2880	31000
3000	32292
3200	34445
3375	36329
3600	38750
3750	40365
4000	43056
4320	46501
4500	48438
4800	51667
5000	53820
5400	58126
5600	60278
5625	60548
6000	64584
6400	68890
6750	72657
7000	75348
7200	77500
7500	80730
8000	86110
8400	90420
8640	93000
9000	96880
9600	103330
10000	107640
10800	116250
11250	121090
12000	129170
13500	145310
14400	155000
16800	180830
18000	193750
21600	232500
27000	290630

Mass

SI Units: g	Imperial Units: oz.
200	7.06
300	10.59
800	28.24
1200	42.36
SI Units: kg	Imperial Units: lb.
135	297.62
900	1984.14

Density

SI Units: kg/m^3	Imperial Units: lbs/ft^3
45	2.809
SI Units: mg/L	Imperial Units: ounce/ imp. gallon
3	0.0005

Volume

SI Units: L	Imperial Units: imp. gal
9.1	2.002
900	197.973
2360	519.129
10000	2199.693
SI Units: m^3	Imperial Units: ft.^{3}
4	141.26
6	211.89
17000	600355

Pressure

SI Units: kg/m^2	Imperial Units: lbs/ft^2
1.7	0.348
SI Units: kPa	Imperial Units: psi
0.05	0.007
0.075	0.011
0.5	0.073
1	0.145
1.4	0.20
1.9	0.28
2.4	0.35
3.6	0.52
4.8	0.7
6	0.9

SI Units, kPa	Imperial Units, psi
7.2	1.0
12	1.7
25	3.6
35	5.1
100	14.5
140	20.3
280	40.6
345	50
450	65
700	102
1000	145
1100	160
10000	1450

Flowrate Volume

SI Units, L/s	Imperial Units, imp. gal/min
0.09	1.188
0.091	1.201
0.19	2.508
0.191	2.521
0.775	10.229
0.85	11.218
0.851	11.232
3.9	51.472
5.7	75.229
6.35	83.807
17	224.366
30	395.945
140	1848
700	9239
1400	18477
5000	65990
SI Units, L/min	Imperial Units, imp. gal./min.
95	20.90
190	41.79
380	83.59
945	207.87
1890	415.74
SI Units, m^3/hr	Imperial Units, ft^3/hr
14	494.41

Force

SI Units, kN	Imperial Units, lbf
0.022	4.946
0.038	8.543
0.09	20.233

SI Units, kN	Imperial Units, lbf
0.15	33.72
0.3	67.44
0.5	112.4
0.9	202.3
1	224.8
1.3	292.3
1.75	393.4
2.2	494.6
4.5	1011.6
9	2023.3
11	2472.9
15	3372.1
18	4046.6
22	4945.8
36	8093.1
54	12139.7

Loading

SI Units, kN/m	Imperial Units, lb/ft
15	1030
SI Units, kN/m^2	Imperial Units, psf
1.5	31.3
1.9	39.7
SI Units, kg/m^2	Imperial Units, psf
0.195	0.04
0.76	0.16
0.98	0.20
1	0.21
1.06	0.22
1.2	0.25
1.36	0.28
1.63	0.34
1.84	0.38
1.9	0.39
8.06	1.7
50	10

Velocity

SI Units, m/s	Imperial Units, ft/second
0.6	1.97
1	3.28
1.3	4.27
1.8	5.91
3	9.8
4.5	14.8
180	590.6

SI Units, m/s	Imperial Units, ft/second
360	1181
760	2493
1500	4921
SI Units, m/min	Imperial Units, ft/min
0.065	0.213
0.14	0.459
21	68.9
38	125

Heat Flow Rate

SI Units, kW	Imperial, Btu/hour
0.1	341.2
0.5	1706.1
0.75	2559.1
4	13649
4.4	15014
120	409460

Temperature

SI Units, °C	Imperial Units, °F
18	64
22	72
43	109
49	120
50	122
70	158
93.3	200
99	210
120	248
700	1292

Permeance

SI Units, ng/Pa•s•m^2	Imperial Units, Perm Ins.
230	4

Insulation

SI Units, RSI	Imperial Units, R
0.16	1
0.53	3
0.7	4
0.9	5.1
1.06	6
1.41	8
1.61	9.1
1.76	10
1.94	11
2.02	11.5
2.1	12
2.29	13
2.4	13.6
2.63	15
2.82	16
3.17	18
3.34	19
3.52	20
3.63	20.6
3.8	21.6
3.83	21.75
3.91	22.2
4.22	24
4.4	25
4.52	25.7
4.67	26.5
4.7	26.7
4.93	28
5.1	29
5.21	29.6
5.55	31.5
5.68	32.3
7	39.75
7.24	41.1
8.8	50
9	51.1

Lighting

lx	ft-candles
1	0.09
2	0.18
10	0.9
50	4.5
100	9
300	27
500	45

Steel Beams

SI Units, Designation	Imperial Units, Designation
W150 X 22	W6 X 15
W200 X 21	W8 X 14
W200 X 27	W8 X 18
W200 X 31	W8 X 21
W250 X 24	W10 X 16
W250 X 33	W10 X 22
W250 X 39	W10X 26
W310 X 31	W12 X 21

SI Units, Designation	Imperial Units, Designation
W310 X 39	W12 X 26

Ministry of Municipal Affairs and Housing
Building and Development Branch

Ontario

2006 Building Code - Supplementary Standards

Supplementary Standard SA-1

Supplementary Standard SA-1

Objectives and Functional Statements Attributed to the Acceptable Solutions

August 15, 2006

COMMENCEMENT

Supplementary Standard SA-1 comes into force on the 31st day of December, 2006.

ERRATA

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SA-1 Objectives and Functional Statements Attributed to the Acceptable Solutions

1. SCOPE

This standard specifies, for the purposes of Article 1.2.1.1. of Division A of the Building Code, the objectives and functional statements that have been attributed to acceptable solutions provided in Division B of the Building Code.

2. OBJECTIVES AND FUNCTIONAL STATEMENTS

The objectives listed in this standard are those set out in Part 2 of Division A of the Building Code.

The functional statements listed in this standard are set out in Part 3 of Division A of the Building Code.

3. ATTRIBUTION TO ACCEPTABLE SOLUTIONS

For the purposes of compliance with the Building Code, as required in Sentence 1.2.1.1.(2) of Division A of the Building Code, the objectives and functional statements attributed to the acceptable solutions in Division B shall be the objectives and functional statements listed in Tables 3 to12.

Table 3
Objectives and Functional Statements Attributed to the Acceptable Solutions in Part 3 of Division B

Acceptable Solutions	Objectives and Functional Statements
3.1.1.1.	**Scope**
(1)	
3.1.1.2.	**Reserved**
3.1.1.3.	**Radon**
(1)	[F40, F50-OH1.1]
3.1.1.4.	**Building in Flood Plains**
(1)	(a) [F20-OP2.1]
	(a) [F20-OS2.1, OS2.3]
	(a) [F61-OH1.3]
	(b) [F10, F12-OS3.1] [F10, F30-OS3.7]
3.1.2.1.	**Classification of Buildings**
(1)	
(2)	
3.1.2.2.	**Occupancies of the Same Classification**
(1)	
3.1.2.3.	**Arena Type Buildings**
(1)	
3.1.2.4.	**Police Stations**
(1)	
3.1.2.5.	**Group B, Division 3 Occupancies**
(1)	
3.1.2.6.	**Restaurants**
(1)	
3.1.3.1.	**Separation of Major Occupancies**
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	[F03-OS1.2]
(3)	
3.1.3.2.	**Prohibition of Occupancy Combinations**
(1)	[F02, F03-OS1.2] [F10-OS1.5]
(2)	[F02, F03-OS1.2] [F10-OS1.5]
(3)	[F41-OH2.1]
(4)	
3.1.4.1.	**Combustible Materials Permitted**
(1)	
3.1.4.2.	**Protection of Foamed Plastics**
(1)	[F01-OP1.1] [F02-OP1.2]
	[F01-OS1.1] [F02-OS1.2]
3.1.4.3.	**Wires and Cables**
(1)	[F02-OP1.2]
	[F02-OS1.2]
(2)	
(3)	
3.1.4.4.	**Fire-Retardant Treated Wood**
(1)	[F02-OP1.2]
	[F02-OS1.2]

Acceptable Solutions	Objectives and Functional Statements
3.1.4.5.	**Heavy Timber Construction Alternative**
(1)	
(2)	
3.1.4.6.	**Heavy Timber Construction**
(1)	
(2)	
(3)	
(4)	
(5)	
(6)	
(7)	
(8)	
(9)	
(10)	
(11)	
(12)	
3.1.5.1.	**Noncombustible Materials**
(1)	[F02-OP1.2]
	[F02-OS1.2]
(2)	
(3)	
(4)	
3.1.5.2.	**Minor Combustible Components**
(1)	
3.1.5.3.	**Combustible Roofing Materials**
(1)	
(2)	
(3)	
(4)	
3.1.5.4.	**Combustible Glazing and Skylights**
(1)	
(2)	
(3)	
(4)	
(5)	
3.1.5.5.	**Combustible Components for Exterior Walls**
(1)	
(2)	
(3)	
(4)	
(5)	
3.1.5.6.	**Nailing Elements**
(1)	
3.1.5.7.	**Combustible Millwork**
(1)	
3.1.5.8.	**Combustible Flooring Elements**
(1)	
(2)	
(3)	
(4)	

Acceptable Solutions	Objectives and Functional Statements
3.1.5.9.	Combustible Stairs in Dwelling Units
(1)	
3.1.5.10.	Combustible Interior Finish
(1)	
(2)	
(3)	
3.1.5.11.	Gypsum Board
(1)	
3.1.5.12.	Combustible Insulation and its Protection
(1)	
(2)	
(3)	
(4)	
(5)	
(6)	
(7)	
3.1.5.13.	Combustible Elements in Partitions
(1)	
(2)	
(3)	
3.1.5.14.	Storage Lockers in Residential Buildings
(1)	
3.1.5.15.	Combustible Ducts
(1)	
(2)	
(3)	
3.1.5.16.	Combustible Piping Materials
(1)	
(2)	
(3)	
3.1.5.17.	Combustible Plumbing Fixtures
(1)	
3.1.5.18.	Wires and Cables
(1)	
(2)	
3.1.5.19.	Combustible Travelling Cables for Elevators
(1)	
3.1.5.20.	Nonmetallic Raceways
(1)	
3.1.5.21.	Wires in Computer Room Floors
(1)	
(2)	
3.1.5.22.	Combustible Components in Public Pools and Public Spas
(1)	
3.1.5.23.	Marquees Having Combustible Elements
(1)	
(2)	
3.1.5.24.	Combustible Mezzanines
(1)	
3.1.5.25.	Wood Decorative Cladding
(1)	

Acceptable Solutions	Objectives and Functional Statements
3.1.7.1.	**Determination of Ratings**
(1)	[F03-OP1.2] [F04-OP1.3]
	[F03-OS1.2] [F04-OS1.3]
(2)	
3.1.7.2.	**Exception for Exterior Walls**
(1)	
3.1.7.3.	**Exposure Conditions for Rating**
(1)	
(2)	
(3)	
3.1.7.4.	**Minimum Fire-Resistance Rating**
(1)	
3.1.7.5.	**Rating of Supporting Construction**
(1)	[F04-OP1.3]
	[F04-OS1.3]
(2)	
(3)	[F04-OP1.3]
	[F04-OS1.3]
3.1.8.1.	**General Requirements**
(1)	(a) [F03-OP1.2]
	(a) [F03-OS1.2]
(2)	[F03-OP1.2] Applies to the requirement that openings in *fire separations* be protected with *closures*, shafts or other means
	[F03-OS1.2] Applies to the requirement that openings in *fire separations* be protected with *closures*, shafts or other means
3.1.8.2.	**Combustible Construction Support**
(1)	[F04-OP1.2]
	[F04-OS1.2]
3.1.8.3.	**Continuity of Fire Separations**
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	[F03-OP1.2]
	[F03-OS1.2]
(3)	(a), (b) [F03-OP1.2]
	(a), (b) [F03-OS1.2]
(4)	[F03-OP1.2]
	[F03-OS1.2]
3.1.8.4.	**Determination of Ratings**
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	[F03-OP1.2]
	[F03-OS1.2]
3.1.8.5.	**Installation of Closures**
(1)	
(2)	[F03-OP1.2]
	[F03-OS1.2]
(3)	[F81-OP1.2]
	[F81-OS1.2]
3.1.8.6.	**Maximum Openings**
(1)	[F03-OP1.2]
	[F03-OS1.2]

Acceptable Solutions	Objectives and Functional Statements
(2)	[F03-OP1.2]
	[F03-OS1.2]
3.1.8.7.	**Fire Dampers**
(1)	[F03-OP1.2]
	[F03-OS1.2]
3.1.8.8.	**Fire Dampers Waived**
(1)	
(2)	
(3)	
(4)	
(5)	
(6)	
(7)	
(8)	
3.1.8.9.	**Installation of Fire Dampers**
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	[F03-OP1.2]
	[F03-OS1.2]
(3)	[F04-OP1.2]
	[F04-OS1.2]
(4)	[F03-OP1.2]
	[F03-OS1.2]
(5)	[F82-OH1.2] Applies to portion of code text "A tightly fitted access door shall be installed for each *fire damper* to provide access for ... the resetting of the release device."
	[F82-OP1.2] Applies to portion of code text "A tightly fitted access door shall be installed for each *fire damper* to provide access for the inspection of the damper..."
	[F82-OS1.2] Applies to portion of code text "A tightly fitted access door shall be installed for each *fire damper* to provide access for the inspection of the damper..."
3.1.8.10.	**Twenty-Minute Closures**
(1)	
(2)	
(3)	[F03-OP1.2]
	[F03-OS1.2]
(4)	
3.1.8.11.	**Self-Closing Devices**
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	
(3)	
(4)	
(5)	
3.1.8.12.	**Hold-Open Devices**
(1)	[F03-OS1.2]
(2)	[F03-OP1.2]
	[F03-OS1.2]
(3)	[F03-OP1.2]
	[F03-OS1.2]
(4)	[F03-OP1.2]
	[F03-OS1.2]
(5)	

Acceptable Solutions	Objectives and Functional Statements
(6)	[F03-OP1.2]
	[F03-OS1.2]
(7)	[F03-OP1.2]
	[F03-OS1.2]
(8)	
3.1.8.13.	**Door Latches**
(1)	[F03-OP1.2]
	[F03-OS1.2]
3.1.8.14.	**Wired Glass and Glass Block**
(1)	
(2)	
(3)	[F04-OP1.2] Applies to portion of Code text: "Glass blocks permitted by Sentence (1) shall be ... reinforced with steel reinforcement in each horizontal joint."
	[F04-OS1.2] Applies to portion of Code text: "Glass blocks permitted by Sentence (1) shall be ... reinforced with steel reinforcement in each horizontal joint."
3.1.8.15.	**Temperature Rise Limit for Doors**
(1)	[F03-OP1.2]
	[F03, F31-OS1.2] [F05-OS1.5]
3.1.8.16.	**Area Limits for Wired Glass and Glass Block**
(1)	[F31-OS1.2] [F05-OS1.5]
	[F30-OS3.1]
(2)	[F31-OS1.2] [F05-OS1.5]
3.1.8.17.	**Temperature Rise and Area Limits Waived**
(1)	
3.1.8.18.	**Sprinkler Protected Glazed Wall Assembly**
(1)	[F03-OP1.2] [F04-OP1.3]
	[F03-OS1.2] [F04-OS1.3]
(2)	[F03-OP1.2] [F04-OP1.3]
	[F03-OS1.2] [F04-OS1.3]
(3)	[F03, F06-OS1.2] [F05, F06-OS1.5]
	[F03, F06-OP1.2]
3.1.9.1.	**Fire Stopping of Service Penetrations**
(1)	[F03-OP1.2] [F04-OP1.3]
	[F03-OS1.2] [F04-OS1.3]
(2)	[F03-OP1.2]
	[F03-OP3.1]
	[F03-OS1.2]
3.1.9.2.	**Combustibility of Service Penetrations**
(1)	[F03-OP1.2] [F02, F04-OP1.3] Applies to portion of Code text: "Except as permitted by Articles 3.1.9.3. and 3.1.9.4., pipes, ducts, electrical outlet boxes, totally enclosed raceways or other similar service equipment that penetrate an assembly required to have a *fire-resistance rating* shall be *noncombustible*..."
	[F03-OS1.2] [F02, F04-OS1.3] Applies to portion of Code text: "Except as permitted by Articles 3.1.9.3. and 3.1.9.4., pipes, ducts, electrical outlet boxes, totally enclosed raceways or other similar service equipment that penetrate an assembly required to have a *fire-resistance rating* shall be *noncombustible*..."
3.1.9.3.	**Penetration by Wires, Cables and Outlet Boxes**
(1)	
(2)	
(3)	
(4)	
(5)	
(6)	[F03-OP1.2]
	[F03-OS1.2]

Acceptable Solutions	Objectives and Functional Statements
3.1.9.4.	**Combustible Piping Penetrations**
(1)	
(2)	Reserved
(3)	[F03-OP1.2] [F02, F04-OP1.3]
	[F03-OS1.2] [F02, F04-OS1.3]
(4)	
(5)	
(6)	
(7)	
(8)	
3.1.9.5.	**Openings through a Membrane Ceiling**
(1)	[F04-OP1.3]
	[F04-OS1.3]
(2)	[F04-OP1.3]
	[F04-OS1.3]
3.1.9.6.	**Plenums**
(1)	
3.1.10.1.	**Prevention of Firewall Collapse**
(1)	[F04-OP1.2]
	[F04-OP3.1]
	[F04-OS1.2]
(2)	[F03, F04-OP1.2]
	[F03, F04-OP3.1]
	[F03, F04-OS1.2]
(3)	
(4)	[F04-OP1.2]
	[F04-OP3.1]
	[F04-OS1.2]
3.1.10.2.	**Rating of Firewalls**
(1)	[F03-OP1.2] Applies to portion of Code text: "A *firewall* which separates a *building* or *buildings* with *floor areas* containing a Group E or a Group F, Division 1 or 2 *major occupancy* shall be constructed as a *fire separation* of *noncombustible construction* having a *fire-resistance rating* not less than 4 h ..."
	[F03-OP3.1] Applies to portion of Code text: "A *firewall* which separates a *building* or *buildings* with *floor areas* containing a Group E or a Group F, Division 1 or 2 *major occupancy* shall be constructed as a *fire separation* of *noncombustible construction having a fire-resistance rating* not less than 4 h ..."
	[F03-OS1.2] Applies to portion of Code text: "A *firewall* which separates a *building* or *buildings* with *floor areas* containing a Group E or a Group F, Division 1 or 2 *major occupancy* shall be constructed as a *fire separation* of *noncombustible construction* having a *fire-resistance rating* not less than 4 h ..."
(2)	[F03-OP1.2]
	[F03-OP3.1]
	[F03-OS1.2]
(3)	[F80, F04-OP1.2]
	[F80, F04-OP1.3]
	[F80, F04-OS1.2]
(4)	[F80, F04-OP1.2]
	[F80, F04-OP3.1]
	[F80, F04-OS1.2]

Acceptable Solutions	Objectives and Functional Statements
3.1.10.3.	**Continuity of Firewalls**
(1)	[F03-OP1.2] Applies to portion of Code text: "A *firewall* shall extend from the ground continuously through, or adjacent to, all *storeys* of a *building* or *buildings* so separated ..."
	[F03-OP3.1] Applies to portion of Code text: "A *firewall* shall extend from the ground continuously through, or adjacent to, all *storeys* of a *building* or *buildings* so separated ..."
	[F03-OS1.2] Applies to portion of Code text: "A *firewa1l* shall extend from the ground continuously through, or adjacent to, all *storeys* of a *building* or *buildings* so separated ..."
(2)	
3.1.10.4.	**Parapets**
(1)	[F03-OP1.2]
	[F03-OP3.1]
	[F03-OS1.2]
(2)	
3.1.10.5.	**Maximum Openings**
(1)	[F03-OP1.2] Applies to portion of Code text: "... the aggregate width of openings shall be not more than 25% of the entire length of the *firewall*."
	[F03-OP3.1] Applies to portion of Code text: "... the aggregate width of openings shall be not more than 25% of the entire length of the *firewall*."
	[F03-OS1.2] Applies to portion of Code text: "... the aggregate width of openings shall be not more than 25% of the entire length of the *firewall*."
3.1.10.6.	**Exposure Protection for Adjacent Walls**
(1)	
3.1.10.7.	**Combustible Projections**
(1)	[F03-OP1.2] Applies to portion of Code text: "*Combustible material* shall not extend across the end of a *firewall*..."
	[F03-OP3.1] Applies to portion of Code text: "*Combustible material* shall not extend across the end of a *firewall*..."
	[F03-OS1.2] Applies to portion of Code text: "*Combustible material* shall not extend across the end of a *firewall*..."
(2)	[F03-OP1.2]
	[F03-OP3.1]
	[F03-OS1.2]
3.1.11.1.	**Separation of Concealed Spaces**
(1)	[F03-OP1.2]
	[F03-OS1.2]
3.1.11.2.	**Fire Stopping in Wall Assemblies**
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	
3.1.11.3.	**Fire Stopping between Nailing and Supporting Elements**
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	[F03-OP1.2]
	[F03-OS1.2]
3.1.11.4.	**Fire Stopping between Vertical and Horizontal Spaces**
(1)	[F03-OP1.2]
	[F03-OS1.2]
3.1.11.5.	**Fire Stopping of Horizontal Concealed Spaces**
(1)	[F03, F04-OP1.2]
	[F03, F04-OS1.2]
(2)	[F03, F04-OP1.2]
	[F03, F04-OS1.2]

Acceptable Solutions	Objectives and Functional Statements
3.1.11.6.	**Fire Stopping of Crawl Spaces**
(1)	[F03, F04-OP1.2]
	[F03, F04–OS1.2]
3.1.11.7.	**Fire Stop Materials**
(1)	[F04-OP1.2]
	[F04-OS1.2]
(2)	
(3)	
(4)	
(5)	[F04-OP1.2]
	[F04-OS1.2]
(6)	[F03-OP1.2]
	[F03-OS1.2]
(7)	
3.1.12.1.	**Determination of Ratings**
(1)	[F02-OP1.2]
	[F02-OS1.2]
(2)	[F02-OP1.2]
	[F02-OS1.2]
(3)	
3.1.13.1.	**Interior Finish Description**
(1)	
3.1.13.2.	**Flame-Spread Rating**
(1)	[F02-OP1.2]
	[F02-OS1.2]
(2)	
(3)	
(4)	
(5)	
3.1.13.3.	**Bathrooms in Residential Suites**
(1)	
(2)	[F02-OP1.2]
	[F02-OS1.2]
3.1.13.4.	**Light Diffusers and Lenses**
(1)	
3.1.13.5.	**Skylights**
(1)	[F02-OS1.5]
3.1.13.6.	**Corridors**
(1)	[F02-OS1.2, OS1.5]
(2)	
(3)	
(4)	
(5)	[F02-OS1.2, OS1.5]
(6)	
3.1.13.7.	**High Buildings**
(1)	[F02-OP1.2]
	[F02-OS1.2]
(2)	
(3)	
(4)	[F02-OP1.2]
	[F02-OS1.2]

Acceptable Solutions	Objectives and Functional Statements
(5)	
(6)	
(7)	
3.1.13.8.	**Noncombustible Construction**
(1)	
3.1.13.9.	**Underground Walkways**
(1)	[F02-OP3.1]
	[F02-OS1.2]
3.1.13.10.	**Exterior Exit Passageway**
(1)	[F02-OS1.5]
3.1.14.1.	**Fire-Retardant Treated Wood Roof Systems**
(1)	[F02-OP1.2]
	[F02-OS1.2]
(2)	[F02-OP1.3]
	[F02-OS1.2, OS1.3]
3.1.14.2.	**Metal Roof Deck Assemblies**
(1)	[F02-OP1.2]
	[F02-OS1.2]
(2)	
3.1.15.1.	**Roof Covering Classification**
(1)	[F02-OP1.2]
	[F02-OP3.1]
	[F02-OS1.2]
3.1.15.2.	**Roof Coverings**
(1)	[F02-OP1.2]
	[F02-OP3.1]
	[F02-OS1.2]
(2)	
3.1.16.1.	**Fabric Awnings, Canopies and Marquees**
(1)	[F02-OP1.2]
	[F02-OS1.2, OS1.5]
3.1.17.1.	**Occupant Load Determination**
(1)	[F10-OS3.7]
	[F72-OH2.1] [F71-OH2.3]
(2)	[F10-OS3.7]
	[F72-OH2.1] [F71-OH2.3]
(3)	
(4)	[F10-OS3.7]
	[F72-OH2.1] [F71-OH2.3]
(5)	[F10-OS3.7]
	[F72-OH2.1] [F71-OH2.3]
(6)	
(7)	
3.1.17.2.	**Dance Floor**
(1)	
3.1.17.3.	**Public Pools**
(1)	[F10-OS3.7]
	[F72-OH2.1] [F71-OH2.3]
(2)	[F10-OS3.7]
	[F72-OH2.1] [F71-OH2.3]

Acceptable Solutions	Objectives and Functional Statements
3.1.18.1.	**Drainage**
(1)	[F60-OH1.1, OH1.2, OH1.3]
	[F60-OS2.3]
3.1.19.1.	**Clearance to Buildings**
(1)	[F01-OP1.1]
	[F01-OS1.1]
	[F32-OS3.3]
(2)	[F01-OP1.1]
	[F01-OS1.1]
	[F32-OS3.3]
3.1.19.2.	**Exception**
(1)	
3.2.1.1.	**Exceptions in Determining Building Height**
(1)	
(2)	
(3)	
(4)	
(5)	
(6)	
(7)	
(8)	
(9)	
3.2.1.2.	**Storage Garage Considered as a Separate Building**
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	[F03-OP1.2]
	[F03-OS1.2]
(3)	[F03-OP1.2]
	[F03-OS1.2]
3.2.1.3.	**Roof Considered as a Wall**
(1)	
3.2.1.4.	**Floor Assembly over Basement**
(1)	[F03-OP1.2] [F04-OP1.3]
	[F03-OS1.2] [F04-OS1.3]
(2)	[F04-OP1.2, OP1.3]
	[F04-OS1.2, OS1.3]
3.2.1.5.	**Fire Containment in Basements**
(1)	[F02-OP1.2, OP1.3]
	[F02-OS1.2, OS1.3]
(2)	
3.2.1.6.	**Mezzanines**
(1)	
3.2.2.1.	**Application**
(1)	
3.2.2.2.	**Special and Unusual Structures**
(1)	[F02, F03, F04-OP1.2, OP1.3]
	[F02, F03, F04–OS1.2, OS1.3]
3.2.2.3.	**Exceptions to Structural Fire Protection**
(1)	
3.2.2.4.	**Buildings with Multiple Major Occupancies**
(1)	

Acceptable Solutions	Objectives and Functional Statements
(2)	
3.2.2.5.	**Applicable Building Height and Area**
(1)	
3.2.2.6.	**Multiple Major Occupancies**
(1)	[F02, F03, F04-OP1.2, OP1.3]
	[F02, F03, F04-OS1.2, OS1.3]
3.2.2.7.	**Superimposed Major Occupancies**
(1)	
(2)	
3.2.2.8.	**Exceptions for Major Occupancies**
(1)	
(2)	
3.2.2.9.	**Crawl Spaces**
(1)	
(2)	
3.2.2.10.	**Streets**
(1)	[F12-OP1.2]
	[F12-OS1.2, OS1.5]
(2)	
(3)	
(4)	
(5)	
3.2.2.11.	**Exterior Balconies**
(1)	
3.2.2.12.	**Exterior Passageways**
(1)	
3.2.2.13.	**Occupancy on Roof**
(1)	
3.2.2.14.	**Roof-Top Enclosures**
(1)	
(2)	
(3)	
(4)	
3.2.2.15.	**Storeys below Ground**
(1)	
(2)	(a) [F02, F04-OP1.2, OP1.3]
	(a) [F02, F04-OS1.2, OS1.3]
	(b), (c) [F03, F04-OP1.2] [F04-OP1.3]
	(b), (c) [F03, F04-OS1.2] [F04-OS1.3]
(3)	
3.2.2.16.	**Heavy Timber Roof Permitted**
(1)	
(2)	
3.2.2.17.	**Sprinklers in Lieu of Roof Rating**
(1)	
3.2.2.18.	**Automatic Sprinkler System Required**
(1)	
3.2.2.19.	**Buildings Containing Impeded Egress Zones**
(1)	
3.2.2.20.	**Group A, Division 1, Any Height, Any Area, Sprinklered**
(1)	

Acceptable Solutions	Objectives and Functional Statements
(2)	[F02-OP1.2] Applies to portion of Code text: "... the *building* referred to in Sentence (1) shall be of *non-combustible construction*..." [F02, F04-OP1.2, OP1.3] Applies to portion of Code text: "a) ... the *building* shall be *sprinklered*."
	[F02-OS1.2] Applies to portion of Code text: "... the *building* referred to in Sentence (1) shall be of *non-combustible construction*...." [F02, F04-OS1.2, OS1.3] Applies to portion of Code text: "a) ... the *building* shall be *sprinklered*."
	(b), (d) [F03, F04-OP1.2] [F04- OP1.3]
	(b), (d) [F03, F04-OS1.2] [F04- OS1.3]
	(c) [F04-OP1.3]
	(c) [F04-OS1.3]
3.2.2.21.	**Group A, Division 1, One Storey, Limited Area**
(1)	
(2)	[F02-OP1.2] Applies to portion of Code text: "The *building* referred to in Sentence (1) is permitted to be of *heavy timber construction* or *noncombustible construction* used singly or in combination." [F03, F04-OP1.2] [F04-OP1.3] Applies to portion of Code text: "a) floor assemblies shall be *fire separations*, i) with a *fire-resistance rating* not less than 45 min," and to Clause (b).
	[F02-OS1.2] Applies to portion of Code text: "The *building* referred to in Sentence (1) is permitted to be of *heavy timber construction* or *noncombustible construction* used singly or in combination." [F03, F04-OS1.2] [F04-OS1.3] Applies to portion of Code text: "a) floor assemblies shall be *fire separations*, i) with a *fire-resistance rating* not less than 45 min," and to Clause (b).
3.2.2.22.	**Group A, Division 1, One Storey**
(1)	
(2)	[F03, F04-OP1.2] [F04-OP1.3] Applies to portion of Code text: "a) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 45 min," and to Clause (d).
	[F03, F04-OS1.2] [F04-OS1.3] Applies to portion of Code text: "a) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 45 min," and to Clause (d).
	(b), (c) [F04-OP1.3]
	(b), (c) [F04-OS1.3]
3.2.2.23.	**Group A, Division 2, Any Height, Any Area, Sprinklered**
(1)	
(2)	[F02-OP1.2] Applies to portion of Code text: "... the *building* referred to in Sentence (1) shall be of *noncombustible construction* ..." [F02, F04-OP1.2, OP1.3] Applies to portion of Code text: "a) ... the *building* shall be *sprinklered*."
	[F02-OS1.2] Applies to portion of Code text: "... the *building* referred to in Sentence (1) shall be of *noncombustible construction* ..." [F02, F04-OS1.2, OS1.3] Applies to portion of Code text: "a) ... the *building* shall be *sprinklered*."
	(b), (d) [F03, F04-OP1.2] [F04-OP1.3]
	(b), (d) [F03, F04-OS1.2] [F04-OS1.3]
	(c) [F04-OP1.3]
	(c) [F04-OS1.3]
3.2.2.24.	**Group A, Division 2, up to 6 Storeys, Any Area, Sprinklered**
(1)	[F02, F04-OP1.2, OP1.3] Applies to portion of Code text: "a) ... the *building* is *sprinklered*."
	[F02, F04-OS1.2, OS1.3] Applies to portion of Code text: "a) ... the *building* is *sprinklered*."
(2)	[F02-OP1.2] Applies to portion of Code text: "... the *building* referred to in Sentence (1) shall be of *noncombustible construction*."
	[F02-OS1.2] Applies to portion of Code text: "... the *building* referred to in Sentence (1) shall be of *noncombustible construction*."
	(a), (c) [F03, F04-OP1.2] [F04-OP1.3]
	(a), (c) [F03, F04-OS1.2] [F04–OS1.3]
	(b) [F04-OP1.3]
	(b) [F04-OS1.3]
3.2.2.25.	**Group A, Division 2, up to 2 Storeys**
(1)	

Acceptable Solutions	Objectives and Functional Statements
(2)	[F04-OP1.3] Applies to portion of Code text: "c) roof assemblies shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min," and to Clause (d).
	[F04-OS1.3] Applies to portion of Code text: "c) roof assemblies shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min," and to Clause (d).
	(a) [F03-OP1.2] Applies to the requirement that *noncombustible* floor assemblies be *fire separations*.
	(a) [F03-OS1.2] Applies to the requirement that *noncombustible* floor assemblies be *fire separations*.
	(a), (d) [F03, F04-OP1.2] [F04-OP1.3]
	(a), (d) [F03, F04-OS1.2] [F04-OS1.3]
	(b) [F04-OP1.3]
	(b) [F04-OS1.3]
3.2.2.26.	**Group A, Division 2, up to 2 Storeys, Increased Area, Sprinklered**
(1)	[F02, F04-OP1.2, OP1.3] Applies to portion of Code text: "a) ... the *building* is *sprinklered*,"
	[F02, F04-OS1.2, OS1.3] Applies to portion of Code text: "a) ... the *building* is *sprinklered*,"
(2)	(a) [F03-OP1.2] Applies to the requirement that *noncombustible* floor assemblies be *fire separations*.
	(a) [F03-OS1.2] Applies to the requirement that *noncombustible* floor assemblies be *fire separations*.
	(a), (c) [F03, F04-OP1.2] [F04-OP1.3]
	(a), (c) [F03, F04-OS1.2] [F04-OS1.3]
	(b) [F04-OP1.3]
	(b) [F04-OS1.3]
3.2.2.27.	**Group A, Division 2, up to 2 Storeys, Sprinklered**
(1)	[F02, F04-OP1.2, OP1.3] Applies to portion of Code text: " a) the *building* is *sprinklered*,"
	[F02, F04-OS1.2, OS1.3] Applies to portion of Code text: " a) the *building* is *sprinklered*,"
3.2.2.28.	**Group A, Division 2, One Storey**
(1)	
(2)	[F03-OP1.2]
	[F03-OS1.2]
3.2.2.29.	**Group A, Division 3, Any Height, Any Area**
(1)	
(2)	[F02-OP1.2] Applies to portion of Code text: "... the *building* referred to in Sentence (1) shall be of *noncombustible construction* ..." [F02, F04-OP1.2, OP1.3] Applies to portion of Code text: "a) ... the *building* shall be *sprinklered* if ..."
	[F02-OS1.2] Applies to portion of Code text: "... the *building* referred to in Sentence (1) shall be of *noncombustible construction* ..." [F02, F04-OS1.2, OS1.3] Applies to portion of Code text: "a) ... the *building* shall be *sprinklered* if ..."
	(b), (e) [F03, F04-OP1.2] [F04-OP1.3]
	(b), (e) [F03, F04-OS1.2] [F04-OS1.3]
	(c) [F04-OP1.3]
	(c) [F04-OS1.3]
(3)	[F02-OP1.2] [F04-OP1.3]
	[F02-OS1.2] [F04–OS1.3]
3.2.2.30.	**Group A, Division 3, up to 2 Storeys**
(1)	

Acceptable Solutions	Objectives and Functional Statements
(2)	[F02-OP1.2] Applies to portion of Code text: "Except as permitted by Clauses (c) and (d), the *building* referred to in Sentence (1) shall be of *noncombustible construction*." [F04-OP1.3] Applies to portion of Code text: "c) roof assemblies shall i) have a *fire-resistance rating* not less than 45 min," and to Clause (d).
	[F02-OS1.2] Applies to portion of Code text: "Except as permitted by Clauses (c) and (d), the *building* referred to in Sentence (1) shall be of *noncombustible construction*." [F04-OS1.3] Applies to portion of Code text: "c) roof assemblies shall i) have a *fire-resistance rating* not less than 45 min," and to Clause (d).
	(a), (d) [F03, F04-OP1.2] [F04-OP1.3]
	(a), (d) [F03, F04-OS1.2] [F04-OS1.3]
	(b) [F04–OP1.3]
	(b) [F04-OS1.3]
(3)	[F02-OP1.2] [F04-OP1.3]
	[F02-OS1.2] [F04–OS1.3]
3.2.2.31.	**Group A, Division 3, up to 2 Storeys, Sprinklered**
(1)	[F02, F04-OP1.2, OP1.3] Applies to portion of Code text: "a) ... the *building* shall be *sprinklered*."
	[F02, F04-OS1.2, OS1.3] Applies to portion of Code text: "a) ... the *building* shall be *sprinklered*."
(2)	[F02-OP1.2] Applies to portion of Code text: "Except as permitted by Clause (c) ... the *building* referred to in Sentence (1) shall be of *noncombustible construction*."
	[F02-OS1.2] Applies to portion of Code text: "Except as permitted by Clause (c) ... the *building* referred to in Sentence (1) shall be of *noncombustible construction*."
	(a), (c) [F03-OP1.2] [F04-OP1.2, OP1.3]
	(a), (c) [F03-OS1.2] [F04-OS1.2, OS1.3]
	(b) [F04-OP1.3]
	(b) [F04-OS1.3]
3.2.2.32.	**Group A, Division 3, One Storey, Increased Area**
(1)	
(2)	[F04-OP1.3] Applies to portion of Code text: "b) roof assemblies shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min," and to Clause (c).
	[F04-OS1.3] Applies to portion of Code text: "b) roof assemblies shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min," and to Clause (c).
	(a), (c) [F04-OP1.3]
	(a), (c) [F04-OS1.3]
(3)	[F02-OP1.2] [F04-OP1.3]
	[F02-OS1.2] [F04-OS1.3]
3.2.2.33.	**Group A, Division 3, One Storey, Sprinklered**
(1)	[F02, F04-OP1.2, OP1.3] Applies to portion of Code text: "a) ... the *building* is *sprinklered*."
	[F02, F04-OS1.2, OS1.3] Applies to portion of Code text: "a) ... the *building* is *sprinklered*."
3.2.2.34.	**Group A, Division 3, One Storey**
(1)	
3.2.2.35.	**Group A, Division 4**
(1)	[F02-OP1.2] Applies to portion of Code text: "a *building* classified as Group A, Division 4 shall be of *noncombustible construction*."
	[F02-OS1.2] Applies to portion of Code text: "a *building* classified as Group A, Division 4 shall be of *noncombustible construction*."
(2)	
(3)	
(4)	[F02, F04-OP1.2, OP1.3]
	[F02, F04-OS1.2, OS1.3]
3.2.2.36.	**Group B, Division 1, Any Height, Any Area, Sprinklered**
(1)	

Acceptable Solutions	Objectives and Functional Statements
(2)	[F02-OP1.2] Applies to portion of Code text: "... the *building* referred to in Sentence (1) shall be of *noncombustible construction*..." [F02, F04-OP1.2, OP1.3] Applies to portion of Code text: "a) ... the *building* shall be *sprinklered*."
	[F02-OS1.2] Applies to portion of Code text: "... the *building* referred to in Sentence (1) shall be of *noncombustible construction* ..." [F02, F04-OS1.2, OS1.3] Applies to portion of Code text: "a) ... the *building* shall be *sprinklered*."
	(b), (d) [F03, F04-OP1.2] [F04-OP1.3]
	(b), (d) [F03, F04-OS1.2] [F04-OS1.3]
	(c) [F04-OP1.3]
	(c) [F04-OS1.3]
3.2.2.37.	**Group B, Division 1, up to 3 Storeys, Sprinklered**
(1)	[F02, F04-OP1.2, OP1.3] Applies to portion of Code text: " a)... the *building* is *sprinklered*"
	[F02, F04-OS1.2, OS1.3] Applies to portion of Code text: " a)... the *building* is *sprinklered*"
(2)	[F02-OP1.2] Applies to portion of Code text: "... the *building* referred to in Sentence (1) shall be of *noncombustible construction* ..."
	[F02-OS1.2] Applies to portion of Code text: "... the *building* referred to in Sentence (1) shall be of *noncombustible construction* ..."
	(a), (c) [F03, F04-OP1.2] [F04-OP1.3]
	(a), (c) [F03, F04-OS1.2] [F04-OS1.3]
	(b) [F04-OP1.3]
	(b) [F04-OS1.3]
3.2.2.38.	**Group B, Division 2 or Division 3, Any Height, Any Area, Sprinklered**
(1)	
(2)	[F02-OP1.2] Applies to portion of Code text: "... the *building referred* to in Sentence (1) shall be of *noncombustible construction*." [F02, F04-OP1.2, OP1.3] Applies to portion of Code text: "a) ... the *building* shall be *sprinklered*."
	[F02-OS1.2] Applies to portion of Code text: "... the *building referred* to in Sentence (1) shall be of *noncombustible construction*." [F02, F04-OS1.2, OS1.3] Applies to portion of Code text: "a) ... the *building* shall be *sprinklered*."
	(b), (d) [F03, F04-OP1.2] [F04-OP1.3]
	(b), (d) [F03, F04-OS1.2] [F04-OS1.3]
	(c) [F04-OP1.3]
	(c) [F04-OS1.3]
3.2.2.39.	**Group B, Division 2 or Division 3, up to 3 Storeys, Sprinklered**
(1)	[F02, F04-OP1.2, OP1.3] Applies to portion of Code text: "a)... the *building* is *sprinklered*."
	[F02, F04-OS1.2, OS1.3] Applies to portion of Code text: "a)... the *building* is *sprinklered*."
(2)	[F02-OP1.2] Applies to portion of Code text: "... the *building* referred to in Sentence (1) shall be of *noncombustible construction*."
	[F02-OS1.2] Applies to portion of Code text: "... the *building* referred to in Sentence (1) shall be of *noncombustible construction*."
	(a), (c) [F03, F04-OP1.2] [F04-OP1.3]
	(a), (c) [F03, F04-OS1.2] [F04-OS1.3]
	(b) [F04-OP1.3]
	(b) [F04-OS1.3]
3.2.2.40.	**Group B, Division 2 or Division 3, up to 2 Storeys, Sprinklered**
(1)	[F02, F04-OS1.2, OS1.3] Applies to portion of Code text: "a) ... the building is *sprinklered*."
	[F02, F04-OS1.2, OS1.3] Applies to portion of Code text: "a) ... the building is *sprinklered*."
(2)	(a), (c) [F03, F04-OP1.2] [F04-OP1.3]
	(a), (c) [F03, F04-OS1.2] [F04-OS1.3]
	(b) [F04-OP1.3]
	(b) [F04-OS1.3]

Acceptable Solutions	Objectives and Functional Statements
3.2.2.41.	**Group B, Division 2 or Division 3, One Storey, Sprinklered**
(1)	[F02, F04-OP1.2, OP1.3] Applies to portion of Code text: "a) ... the building is *sprinklered*,"
	[F02, F04-OS1.2, OS1.3] Applies to portion of Code text: "a) ... the building is *sprinklered*."
3.2.2.42.	**Group C, Any Height, Any Area**
(1)	
(2)	[F02-OP1.2] Applies to portion of Code text: "...the *building* referred to in Sentence (1) shall be of *noncombustible construction*."
	[F02-OS1.2] Applies to portion of Code text: "...the *building* referred to in Sentence (1) shall be of *noncombustible construction*."
	(b), (d) [F03, F04-OP1.2] [F04-OP1.3]
	(b), (d) [F03, F04-OS1.2] [F04-OS1.3]
	(c) [F04-OP1.3]
	(c) [F04-OS1.3]
(3)	
3.2.2.43.	**Group C, up to 6 Storeys**
(1)	
(2)	[F02-OP1.2] Applies to portion of Code text: "...the *building* referred to in Sentence (1) shall be of *noncombustible construction*."
	[F02-OS1.2] Applies to portion of Code text: "...the *building* referred to in Sentence (1) shall be of *noncombustible construction*."
	(a), (c) [F03, F04-OP1.2] [F04-OP1.3]
	(a), (c) [F03, F04-OS1.2] [F04-OS1.3]
	(b) [F04-OP1.3]
	(b) [F04-OS1.3]
(3)	
3.2.2.44.	**Reserved**
3.2.2.45.	**Group C, up to 4 Storeys, Sprinklered**
(1)	[F02, F04-OP1.2, OP1.3] Applies to portion of Code text: "a)... the *building* is *sprinklered*,"
	[F02, F04-OS1.2, OS1.3] Applies to portion of Code text: "a)... the *building* is *sprinklered*,"
(2)	[F03, F04-OP1.2] [F04-OP1.3] Applies to portion of Code text: "a) ... floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 1 h," and to Clause (c).
	[F03, F04-OS1.2] [F04-OS1.3] Applies to portion of Code text: "a) ... floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 1 h," and to Clause (c).
	(b), (c) [F04-OP1.3]
	(b), (c) [F04-OS1.3]
(3)	
(4)	
3.2.2.46.	**Group C, up to 3 Storeys, Increased Area**
(1)	
(2)	[F03, F04-OP1.2] [F04-OP1.3] Applies to portion of Code text: "a) ... floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 1 h," and to Clause (d).
	[F03, F04-OS1.2] [F04-OS1.3] Applies to portion of Code text: "a) ... floor assemblies shall be fire *separations* with a *fire-resistance rating* not less than 1 h," and to Clause (d).
	(b), (c), (d) [F04-OP1.3]
	(b), (c), (d) [F04-OS1.3]
(3)	
(4)	
3.2.2.47.	**Group C, up to 3 Storeys**
(1)	

Acceptable Solutions	Objectives and Functional Statements
(2)	[F03, F04-OP1.2] [F04-OP1.3] Applies to portion of Code text: "a)... floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 45 min," and to Clause (c).
	[F03, F04-OS1.2] [F04-OS1.3] Applies to portion of Code text: "a) ... floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 45 min," and to Clause (c).
	(b), (c) [F04-OP1.3]
	(b), (c) [F04-OS1.3]
(3)	
(4)	
3.2.2.48.	**Group C, up to 3 Storeys, Sprinklered**
(1)	[F02, F04-OP1.2, OP1.3] Applies to portion of Code text: " a)... the *building* is *sprinklered*."
	[F02, F04-OS1.2, OS1.3] Applies to portion of Code text: " a)... the *building* is *sprinklered*."
(2)	[F03, F04-OP1.2] [F04-OP1.3] Applies to portion of Code text: "a) ... floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 45 min," and to Clause (c).
	[F03, F04-OS1.2] [F04-OS1.3] Applies to portion of Code text: "a) ... floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 45 min," and to Clause (c).
	(b), (c) [F04-OP1.3]
	(b), (c) [F04–OS1.3]
(3)	
(4)	
3.2.2.49.	**Group D, Any Height, Any Area**
(1)	
(2)	[F02-OP1.2] Applies to portion of Code text: "... the *building* referred to in Sentence (1) shall be of *noncombustible construction*." [F02, F04-OP1.2, OP1.3] Applies to portion of Code text: " a)... the *building* shall be *sprinklered* ..."
	[F02-OS1.2] Applies to portion of Code text: "... the *building* referred to in Sentence (1) shall be of *noncombustible construction*." [F02, F04-OS1.2, OS1.3] Applies to portion of Code text: " a)... the *building* shall be *sprinklered* ..."
	(b), (d) [F03, F04-OP1.2] [F04-OP1.3]
	(b), (d) [F03, F04-OS1.2] [F04-OS1.3]
	(c) [F04-OP1.3]
	(c) [F04-OS1.3]
3.2.2.50.	**Group D, up to 6 Storeys**
(1)	
(2)	[F02-OP1.2] Applies to portion of Code text: "The *building referred* to in Sentence (1) shall be of *noncombustible construction*." [F04-OP1.3] Applies to portion of Code text: "c) roof assemblies shall have a *fire-resistance rating* not less than 1 h," and to Clause (d).
	[F02-OS1.2] Applies to portion of Code text: "The *building* referred to in Sentence (1) shall be of *noncombustible construction*." [F04-OS1.3] Applies to portion of Code text: "c) roof assemblies shall have a *fire-resistance rating* not less than 1 h," and to Clause (d).
	(a), (d) [F03, F04-OP1.2] [F04-OP1.3]
	(a), (d) [F03, F04-OS1.2] [F04-OS1.3]
	(b) [F04-OP1.3]
	(b) [F04-OS1.3]
3.2.2.51.	**Group D, up to 6 Storeys, Sprinklered**
(1)	[F02, F04-OP1.2, OP1.3] Applies to portion of Code text: " a)... the *building* is *sprinklered*."
	[F02, F04-OS1.2, OS1.3] Applies to portion of Code text: " a)... the *building* is *sprinklered*."

Acceptable Solutions	Objectives and Functional Statements
(2)	[F02-OP1.2] Applies to portion of Code text: "... the *building* referred to in Sentence (1) shall be of *noncombustible construction*."
	[F02-OS1.2] Applies to portion of Code text: "... the *building* referred to in Sentence (1) shall be of *noncombustible construction*."
	(a), (c) [F03, F04-OP1.2] [F04-OP1.3]
	(a), (c) [F03, F04-OS1.2] [F04-OS1.3]
	(b) [F04-OP1.3]
	(b) [F04-OS1.3]
3.2.2.52.	**Group D, up to 4 Storeys, Sprinklered**
(1)	[F02, F04-OP1.2, OP1.3] Applies to portion of Code text: "a)...the *building* is *sprinklered*."
	[F02, F04-OS1.2, OS1.3] Applies to portion of Code text: "a)...the *building* is *sprinklered*."
(2)	(a), (c) [F03, F04-OP1.2] [F04-OP1.3]
	(a), (c) [F03, F04-OS1.2] [F04-OS1.3]
	(b) [F04-OP1.3]
	(b) [F04-OS1.3]
3.2.2.53.	**Group D, up to 3 Storeys**
(1)	
e_1 (2)	[F04-OP1.3] Applies to portion of Code text: "c) roof assemblies shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min...." and to Clause (d).
	[F04-OS1.3] Applies to portion of Code text: "c) roof assemblies shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min...." and to Clause (d).
	(a) [F03-OP1.2] Applies to the requirement that *noncombustible* floor assemblies be *fire separations*.
	(a) [F03-OS1.2] Applies to the requirement that *noncombustible* floor assemblies be *fire separations*.
	(a), (d) [F03, F04-OP1.2] [F04-OP1.3]
	(a), (d) [F03, F04-OS1.2] [F04-OS1.3]
	(b) [F04-OP1.3]
	(b) [F04-OS1.3]
3.2.2.54.	**Group D, up to 3 Storeys, Sprinklered**
(1)	[F02, F04-OP1.2, OP1.3] Applies to portion of Code text: "a)...the *building* is *sprinklered*."
	[F02, F04-OS1.2, OS1.3] Applies to portion of Code text: "a)...the *building* is *sprinklered*."
(2)	(a) [F03-OP1.2] Applies to the requirement that *noncombustible* floor assemblies be *fire separations*.
	(a) [F03-OS1.2] Applies to the requirement that *noncombustible* floor assemblies be *fire separations*.
	(a), (c) [F03, F04-OP1.2] [F04-OP1.3]
	(a), (c) [F03, F04-OS1.2] [F04-OS1.3]
	(b) [F04-OP1.3]
	(b) [F04-OS1.3]
3.2.2.55.	**Group D, up to 2 Storeys**
(1)	
(2)	[F03, F04-OP1.2] [F04-OP1.3]
	[F03, F04-OS1.2] [F04-OS1.3]
	(a) [F03-OP1.2] Applies to the requirement that *noncombustible* floor assemblies be *fire separations*.
	(a) [F03-OS1.2] Applies to the requirement that *noncombustible* floor assemblies be *fire separations*.
3.2.2.56.	**Group D, up to 2 Storeys, Sprinklered**
(1)	[F02, F04-OP1.2, OP1.3] Applies to portion of Code text: "a) ...the *building* is *sprinklered*."
	[F02, F04-OS1.2, OS1.3] Applies to portion of Code text: "a) ...the *building* is *sprinklered*."
(2)	[F03, F04-OP1.2] [F04-OP1.3]
	[F03, F04-OS1.2] [F04-OS1.3]
	(a) [F03-OP1.2] Applies to the requirement that *noncombustible* floor assemblies be *fire separations*.
	(a) [F03-OS1.2] Applies to the requirement that *noncombustible* floor assemblies be *fire separations*.

Acceptable Solutions	Objectives and Functional Statements
3.2.2.57.	**Group E, Any Height, Any Area, Sprinklered**
(1)	
(2)	[F02-OP1.2] Applies to portion of Code text: “... the *building* referred to in Sentence (1) shall be of *noncombustible construction.*” [F02, F04-OP1.2, OP1.3] Applies to portion of Code text: “ a) ... the *building* shall be *sprinklered.*”
	[F02-OS1.2] Applies to portion of Code text: “... the *building* referred to in Sentence (1) shall be of *noncombustible construction.*” [F02, F04-OS1.2, OS1.3] Applies to portion of Code text: “ a) ... the *building* shall be *sprinklered.*”
	(b), (d) [F03, F04-OP1.2] [F04-OP1.3]
	(b), (d) [F03, F04-OS1.2] [F04-OS1.3]
	(c) [F04-OP1.3]
	(c) [F04-OS1.3]
3.2.2.58.	**Group E, up to 4 Storeys, Sprinklered**
(1)	[F02, F04-OP1.2, OP1.3] Applies to portion of Code text: “ a) ... the *building* shall be *sprinklered.*”
	[F02, F04-OS1.2, OS1.3] Applies to portion of Code text: “ a) ... the *building* shall be *sprinklered.*”
(2)	(a), (c) [F03, F04-OP1.2] [F04-OP1.3]
	(a), (c) [F03, F04-OS1.2] [F04-OS1.3]
	(b) [F04-OP1.3]
	(b) [F04-OS1.3]
3.2.2.59.	**Group E, up to 3 Storeys**
(1)	
(2)	(a), (e) [F03, F04-OP1.2] [F04-OP1.3]
	(a), (e) [F03, F04-OS1.2] [F04-OS1.3]
	(b), (c), (d) [F04-OP1.3]
	(b), (c), (d) [F04-OS1.3]
3.2.2.60.	**Group E, up to 3 Storeys, Sprinklered**
(1)	[F02, F04-OP1.2, OP1.3] Applies to portion of Code text: “ a) ... the *building* is *sprinklered.*”
	[F02, F04-OS1.2, OS1.3] Applies to portion of Code text: “ a) ... the *building* is *sprinklered.*”
(2)	(a), (d) [F03, F04-OP1.2] [F04-OP1.3]
	(a), (d) [F03, F04-OS1.2] [F04-OS1.3]
	(b), (c) [F04-OP1.3]
	(b), (c) [F04-OS1.3]
3.2.2.61.	**Group E, up to 2 Storeys**
(1)	
(2)	[F03, F04-OS1.2] [F04-OS1.3]
	(a), (b) [F03, F04-OP1.2] [F04-OP1.3]
3.2.2.62.	**Group E, up to 2 Storeys, Sprinklered**
(1)	[F02, F04-OP1.2, OP1.3] Applies to portion of Code text: “ a) ... the *building* is *sprinklered.*”
	[F02, F04-OS1.2, OS1.3] Applies to portion of Code text: “ a) ... the *building* is *sprinklered.*”
(2)	[F03, F04-OS1.2] [F04-OS1.3]
	(a), (b) [F03, F04-OP1.2] [F04-OP1.3]
3.2.2.63.	**Group F, Division 1, up to 4 Storeys, Sprinklered**
(1)	

Acceptable Solutions	Objectives and Functional Statements
(2)	[F02-OP1.2] Applies to portion of Code text: "... the *building* referred to in Sentence (1) shall be of *noncombustible construction*," [F02, F04-OP1.2, OP1.3] Applies to portion of Code text: " a) ... the *building* shall be *sprinklered*,"
	[F02-OS1.2] Applies to portion of Code text: "... the *building* referred to in Sentence (1) shall be of *noncombustible construction*," [F02, F04-OS1.2, OS1.3] Applies to portion of Code text: " a) ... the *building* shall be *sprinklered*,"
	(b), (d) [F03, F04-OP1.2] [F04-OP1.3]
	(b), (d) [F03, F04-OS1.2] [F04-OS1.3]
	(c) [F04-OP1.3]
	(c) [F04-OS1.3]
3.2.2.64.	**Group F, Division 1, up to 3 Storeys, Sprinklered**
(1)	[F02, F04-OP1.2, OP1.3] Applies to portion of Code text: " a) ... the *building* is *sprinklered*,"
	[F02, F04-OS1.2, OS1.3] Applies to portion of Code text: " a) ... the *building* is *sprinklered*."
(2)	[F02-OP1.2] Applies to portion of Code text: "The *building* referred to in Sentence (1) is permitted to be of *heavy timber construction* or *noncombustible construction* used singly or in combination,..." [F03, F04-OP1.2] [F04-OP1.3]
	[F02-OS1.2] Applies to portion of Code text: "The *building* referred to in Sentence (1) is permitted to be of *heavy timber construction* or *noncombustible construction* used singly or in combination,..." [F03, F04-OS1.2] [F04-OS1.3]
3.2.2.65.	**Group F, Division 1, up to 2 Storeys, Sprinklered**
(1)	[F02, F04-OP1.2, OP1.3] Applies to portion of Code text: " a) ... the *building* is *sprinklered*."
	[F02, F04-OS1.2, OS1.3] Applies to portion of Code text: " a) ... the *building* is *sprinklered*."
(2)	[F03-OP1.2] Applies to portion of Code text: "a) [noncombustible] floor assemblies shall be *fire separations* ..." [F04-OP1.2, OP1.3]
	[F03-OS1.2] Applies to portion of Code text: "a) [noncombustible] floor assemblies shall be *fire separations* ..." [F04-OS1.2, OS1.3]
3.2.2.66.	**Group F, Division 1, One Storey**
(1)	
3.2.2.67.	**Group F, Division 2, Any Height, Any Area, Sprinklered**
(1)	
(2)	[F02-OP1.2] Applies to portion of Code text: "... the *building* referred to in Sentence (1) shall be of *noncombustible construction*." [F02, F04-OP1.2, OP1.3] Applies to portion of Code text: "a)... the *building* shall be *sprinklered*."
	[F02-OS1.2] Applies to portion of Code text: "... the *building* referred to in Sentence (1) shall be of *noncombustible construction*." [F02, F04-OS1.2, OS1.3] Applies to portion of Code text: " a) ... the *building* shall be *sprinklered*."
	(b), (d) [F03, F04-OP1.2] [F04-OP1.3]
	(b), (d) [F03, F04-OS1.2] [F04-OS1.3]
	(c) [F04-OP1.3]
	(c) [F04-OS1.3]

Acceptable Solutions	Objectives and Functional Statements
3.2.2.68.	**Group F, Division 2, up to 6 Storeys**
(1)	
(2)	[F02-OP1.2] Applies to portion of Code text: "the *building referred* to in Sentence (1) shall be of *noncombustible construction*," [F04-OP1.3] Applies to portion of Code text: "c) roof assemblies shall have a *fire-resistance rating* not less than 1 h," and to Clause (d).
	[F02-OS1.2] Applies to portion of Code text: "the *building* referred to in Sentence (1) shall be of *noncombustible construction*," [F04-OS1.3] Applies to portion of Code text: "c) roof assemblies shall have a *fire-resistance rating* not less than 1 h," and to Clause (d).
	(a), (d) [F03, F04-OP1.2] [F04-OP1.3]
	(a), (d) [F03, F04-OS1.2] [F04-OS1.3]
	(b) [F04-OP1.3]
	(b) [F04-OS1.3]
3.2.2.69.	**Group F, Division 2, up to 4 Storeys, Increased Area**
(1)	
(2)	[F02-OP1.2] Applies to portion of Code text: "the *building referred* to in Sentence (1) shall be of *noncombustible construction*," [F04-OP1.3] Applies to portion of Code text: "c) ... roof assemblies shall have a *fire-resistance rating* not less than 1 h," and to Clause (d).
	[F02-OS1.2] Applies to portion of Code text: "the *building* referred to in Sentence (1) shall be of *noncombustible construction*," [F04-OS1.3] Applies to portion of Code text: "c) ... roof assemblies shall have a *fire-resistance rating* not less than 1 h," and to Clause (d).
	(a) [F03, F04-OP1.2] [F04-OP1.3]
	(a) [F03, F04-OS1.2] [F04-OS1.3]
	(b) [F04-OP1.3]
	(b) [F04-OS1.3]
3.2.2.70.	**Group F, Division 2, up to 4 Storeys**
(1)	
(2)	(a), (e) [F03, F04-OP1.2] [F04-OP1.3]
	(a), (e) [F03, F04-OS1.2] [F04-OS1.3]
	(b), (c), (d) [F04-OP1.3]
	(b), (c), (d) [F04-OS1.3]
3.2.2.71.	**Group F, Division 2, up to 2 Storeys**
(1)	
(2)	[F03, F04-OP1.2] [F04-OP1.3]
	[F03, F04-OS1.2] [F04-OS1.3]
	(a) [F03-OP1.2] Applies to the requirement that *noncombustible* floor assemblies be *fire separations*.
	(a) [F03-OS1.2] Applies to the requirement that *noncombustible* floor assemblies be *fire separations*.
3.2.2.72.	**Group F, Division 2, up to 2 Storeys, Sprinklered**
(1)	[F02, F04-OP1.2, OP1.3] Applies to portion of Code text: "a) ... the *building* is *sprinklered*."
	[F02, F04-OS1.2, OS1.3] Applies to portion of Code text: " a) ... the *building* is *sprinklered*."
(2)	[F03, F04-OP1.2] [F04-OP1.3]
	[F03, F04-OS1.2] [F04-OS1.3]
	(a) [F03-OP1.2] Applies to the requirement that *noncombustible* floor assemblies be *fire separations*.
	(a) [F03-OS1.2] Applies to the requirement that *noncombustible floor* assemblies be *fire separations*.

Acceptable Solutions	Objectives and Functional Statements
3.2.2.73.	**Group F, Division 3, Any Height, Any Area**
(1)	
(2)	[F02-OP1.2] Applies to portion of Code text: "...the *building* referred to in Sentence (1) shall be of *noncombustible construction*."
	[F02-OS1.2] Applies to portion of Code text: "...the *building* referred to in Sentence (1) shall be of *noncombustible construction*."
	(b), (d) [F03, F04-OP1.2] [F04-OP1.3]
	(b), (d) [F03, F04-OS1.2] [F04-OS1.3]
	(c) [F04-OP1.3]
	(c) [F04-OS1.3]
3.2.2.74.	**Group F, Division 3, up to 6 Storeys**
(1)	
(2)	[F02-OP1.2] Applies to portion of Code text: "The *building* referred to in Sentence (1) shall be of *noncombustible construction*."
	[F02-OS1.2] Applies to portion of Code text: "The *building* referred to in Sentence (1) shall be of *noncombustible construction*."
	(a), (d) [F03, F04-OP1.2] [F04-OP1.3]
	(a), (d) [F03, F04-OS1.2] [F04-OS1.3]
	(b), (c) [F04-OP1.3]
	(b), (c) [F04-OS1.3]
3.2.2.75.	**Group F, Division 3, up to 6 Storeys, Sprinklered**
(1)	[F02, F04-OP1.2, OP1.3] Applies to portion of Code text: "a)... the *building* is *sprinklered*."
	[F02, F04-OS1.2, OS1.3] Applies to portion of Code text: "a)... the *building* is *sprinklered*."
(2)	[F02-OP1.2] Applies to portion of Code text: "... the *building* referred to in Sentence (1) shall be of *noncombustible construction*."
	[F02-OS1.2] Applies to portion of Code text: "... the *building* referred to in Sentence (1) shall be *of noncombustible construction*."
	(a), (c) [F03, F04-OP1.2] [F04-OP1.3]
	(a), (c) [F03, F04-OS1.2] [F04-OS1.3]
	(b) [F04–OP1.3]
	(b) [F04-OS1.3]
3.2.2.76.	**Group F, Division 3, up to 4 Storeys**
(1)	
(2)	[F04-OP1.3] Applies to portion of Code text: "c) roof assemblies shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min. ..." and to Clause (d).
	[F04-OS1.3] Applies to portion of Code text: "c) roof assemblies shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min. ..." and to Clause (d).
	(a) [F03-OP1.2] Applies to the requirement that *noncombustible* floor assemblies be *fire separations*.
	(a) [F03-OS1.2] Applies to the requirement that *noncombustible* floor assemblies be *fire separations*.
	(a), (d) [F03, F04-OP1.2] [F04-OP1.3]
	(a), (d) [F03, F04-OS1.2] [F04-OS1.3]
	(b) [F04-OP1.3]
	(b) [F04-OS1.3]
3.2.2.77.	**Group F, Division 3, up to 4 Storeys, Sprinklered**
(1)	[F02, F04-OP1.2, OP1.3] Applies to portion of Code text: "a) the *building* is *sprinklered*."
	[F02, F04-OS1.2, OS1.3] Applies to portion of Code text: "a) the *building* is *sprinklered*."
(2)	(a) [F03-OP1.2] Applies to the requirement that *noncombustible* floor assemblies be *fire separations*.
	(a) [F03-OS1.2] Applies to the requirement that *noncombustible* floor assemblies be *fire separations*.
	(a), (c) [F03, F04-OP1.2] [F04-OP1.3]
	(a), (c) [F03, F04-OS1.2] [F04-OS1.3]
	(b) [F04-OP1.3]
	(b) [F04-OS1.3]

Acceptable Solutions	Objectives and Functional Statements
3.2.2.78.	**Group F, Division 3, up to 2 Storeys**
(1)	
(2)	[F03, F04-OP1.2] [F04-OP1.3]
	[F03, F04-OS1.2] [F04-OS1.3]
	(a) [F03-OP1.2] Applies to the requirement that *noncombustible* floor assemblies be *fire separations*.
	(a) [F03-OS1.2] Applies to the requirement that *noncombustible* floor assemblies be *fire separations*.
3.2.2.79.	**Group F, Division 3, up to 2 Storeys, Sprinklered**
(1)	[F02, F04-OP1.2, OP1.3] Applies to portion of Code text: "a) ... the *building* is *sprinklered*,"
	[F02, F04-OS1.2, OS1.3] Applies to portion of Code text: "a) ... the *building* is *sprinklered*,"
(2)	[F03, F04-OP1.2] [F04-OP1.3]
	[F03, F04-OS1.2] [F04-OS1.3]
	(a) [F03-OP1.2] Applies to the requirement that *noncombustible* floor assemblies be *fire separations*.
	(a) [F03-OS1.2] Applies to the requirement that *noncombustible* floor assemblies be *fire separations*.
3.2.2.80.	**Group F, Division 3, One Storey**
(1)	[F02-OP1.2] Applies to portion of Code text: "A *building* classified as Group F, Division 3 is permitted to be of *heavy timber construction* or *noncombustible construction* used singly or in combination ..."
	[F02-OS1.2] Applies to portion of Code text: "A *building* classified as Group F, Division 3 is permitted to be of *heavy timber construction* or *noncombustible construction* used singly or in combination ..."
3.2.2.81.	**Group F, Division 3, One Storey, Sprinklered**
(1)	[F02-OP1.2] Applies to portion of Code text: "A *building* classified as Group F, Division 3 is permitted to be of *heavy timber construction* or *noncombustible construction* used singly or in combination ..." [F02, F04-OP1.2, OP1.3] Applies to portion of Code text: "a) ... the *building* is *sprinklered*,"
	[F02-OS1.2] Applies to portion of Code text: "A *building classified* as Group F, Division 3 is permitted to be of *heavy timber construction* or *noncombustible construction* used singly or in combination ..." [F02, F04-OS1.2, OS1.3] Applies to portion of Code text: " a) ... the *building* is *sprinklered*,"
3.2.2.82.	**Group F, Division 3, One Storey, Any Area, Low Fire Load Occupancy**
(1)	
(2)	[F02-OP1.2]
	[F02-OS1.2]
3.2.2.83.	**Group F, Division 3, Storage Garages up to 22 m High**
(1)	[F02-OP1.2] Applies to portion of Code text: "A *building* used as a *storage garage* with all *storeys* constructed as *open-air storeys* and having on other *occupancy* above it is permitted to have its floor, wall, ceiling and roof assemblies constructed without a *fire-resistance rating* provided it is a) of *noncombustible construction*."
	[F02-OS1.2] Applies to portion of Code text: "A *building* used as a *storage garage* with all *storeys* constructed as *open-air storeys* and having on other *occupancy* above it is permitted to have its floor, wall, ceiling and roof assemblies constructed without a *fire-resistance rating* provided it is a) of *noncombustible construction*."
3.2.3.1.	**Limiting Distance and Area of Unprotected Openings**
(1)	[F03-OP3.1]
(2)	
(3)	
(4)	
(5)	[F03-OP3.1]
(6)	[F03-OP3.1]
(7)	[F03-OP3.1]
(8)	
(9)	
3.2.3.2.	**Area of Exposing Building Face**
(1)	
(2)	[F03-OP3.1]
(3)	
3.2.3.3.	**Wall Enclosing Attic or Roof Space**
(1)	

Acceptable Solutions	Objectives and Functional Statements
3.2.3.4.	**Reserved**
3.2.3.5.	**Wall with Limiting Distance Less Than 1.2 m**
(1)	[F03-OP3.1]
(2)	[F03-OP3.1]
3.2.3.6.	**Combustible Projections**
(1)	[F03-OP3.1]
3.2.3.7.	**Construction of Exposing Building Face**
(1)	[F02, F03-OP3.1]
(2)	[F02, F03-OP3.1]
(3)	[F03-OP3.1]
(4)	[F02, F03-OP3.1]
(5)	[F02, F03-OP3.1]
(6)	[F03-OP3.1]
(7)	
(8)	
3.2.3.8.	**Protection of Exterior Building Face**
(1)	[F01, F02-OP1.2] [F01, F02, F04-OS1.2] [F02-OP3.1]
(2)	
3.2.3.9.	**Protection of Structural Members**
(1)	[F04-OP1.3]
	[F04-OS1.3]
(2)	
3.2.3.10.	**Unlimited Unprotected Openings**
(1)	[F03-OP3.1]
(2)	[F03-OP3.1]
3.2.3.11.	**Low Fire Load, One Storey Building**
(1)	(a) [F04-OP3.1]
	(b) [F03-OP3.1]
3.2.3.12.	**Area Increase for Unprotected Openings**
(1)	[F03-OP3.1]
3.2.3.13.	**Protection of Exit Facilities**
(1)	
(2)	
(3)	
(4)	[F06-OP1.2]
	[F05, F06-OS1.2]
3.2.3.14.	**Wall Exposed to Another Wall**
(1)	[F03-OP1.2]
	[F03-OP3.1]
	[F03-OS1.2]
(2)	[F03-OP1.2]
	[F03-OP3.1]
	[F03-OS1.2]
(3)	
3.2.3.15.	**Wall Exposed to Adjoining Roof**
(1)	[F03-OP1.2]
	[F03-OS1.2]

Acceptable Solutions	Objectives and Functional Statements
3.2.3.16.	**Protection of Soffits**
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	[F03-OP1.2]
	[F03-OS1.2]
(3)	[F03-OP1.2]
	[F03-OS1.2]
(4)	[F02-OP1.2]
	[F02-OS1.2]
3.2.3.17.	**Canopy Protection for Vertically Separated Openings**
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	[F03-OP1.2]
	[F03-OS1.2]
(3)	[F02-OP1.2]
	[F02-OS1.2]
3.2.3.18.	**Covered Vehicular Passageway**
(1)	[F03-OP3.1]
(2)	[F03-OP3.1]
3.2.3.19.	**Walkway between Buildings**
(1)	[F03-OP3.1]
(2)	[F02-OP3.1]
(3)	[F02, F12-OP3.1]
(4)	
(5)	
3.2.3.20.	**Underground Walkway**
(1)	[F01, F02-OP3.1]
(2)	[F03-OP3.1]
(3)	[F02-OP3.1] Applies to portion of Code text: "An underground walkway shall be of *noncombustible construction*..."
	[F80-OP2.3] Applies to portion of Code text: "An underground walkway shall be ... suitable for an underground location."
(4)	(a) [F06-OS1.2] [F05-OS1.5]
	(b) [F12-OS1.2] [F10-OS1.5]
(5)	
3.2.4.1.	**Determination of Requirement for a Fire Alarm System**
(1)	
(2)	[F11-OS1.5]
(3)	
(4)	
(5)	
3.2.4.2.	**Continuity of Fire Alarm System**
(1)	[F11-OS1.5]
(2)	[F11-OS1.5]
(3)	[F11-OS1.5]
(4)	[F03-OS1.2] [F10-OS1.5]
(5)	[F11, F13-OS1.2]
3.2.4.3.	**Types of Fire Alarm Systems**
(1)	(a) [F11-OS1.5]
	(b) [F11-OS1.4] [F13-OS1.5]
	(c), (d), (e) [F11-OS1.5]

Acceptable Solutions	Objectives and Functional Statements
3.2.4.4.	**Description of Fire Alarm Systems**
(1)	[F11-OS1.5]
(2)	(a), (d) [F11-OS1.4] [F13-OS1.5]
	(b), (c) [F11-OS1.5]
(3)	[F13-OS1.5]
(4)	[F13-OS1.5]
3.2.4.5.	**Installation and Verification of Fire Alarm Systems**
(1)	[F12, F13, F81-OS1.2] [F11, F12, F13, F81-OS1.5]
	[F11, F12-OS3.7] Applies to voice communication systems.
(2)	[F82-OS1.5]
3.2.4.6.	**Silencing of Alarm Signals**
(1)	[F11-OS1.5]
(2)	[F34, F81-OS1.5]
(3)	
3.2.4.7.	**Signals to Fire Department**
(1)	[F13-OP1.2]
	[F13-OS1.2, OS1.5]
(2)	[F13-OP1.2]
	[F13-OS1.2, OS1.5]
(3)	[F13-OP1.2]
	[F13-OS1.2, OS1.5]
(4)	[F13, F81-OP1.2]
	[F13, F81-OS1.2, OS1.5]
(5)	[F13-OP1.2]
	[F13-OS1.2, OS1.5]
3.2.4.8.	**Annunciator and Zone Indication**
(1)	[F12-OS1.2, OS1.5]
(2)	[F12-OS1.2, OS1.5]
(3)	
(4)	[F12-OS1.2, OS1.5]
(5)	
(6)	
(7)	[F12-OS1.2, OS1.5]
(8)	[F12-OS1.2, OS1.5]
(9)	[F12-OS1.2, OS1.5]
3.2.4.9.	**Electrical Supervision**
(1)	[F82-OS1.2, OS1.5]
(2)	(a), (d), (e), (f), (g) [F82-OP1.2]
	(a), (d), (e), (f), (g) [F82-OS1.2]
	(b), (c) [F82-OS1.5]
3.2.4.10.	**Fire Detectors**
(1)	[F11-OS1.5]
(2)	[F11-OS1.5]
3.2.4.11.	**Smoke and Heat Detectors**
(1)	[F11-OS1.5]
(2)	[F11-OS1.5]
(3)	[F12-OS1.5]
3.2.4.12.	**Prevention of Smoke Circulation**
(1)	[F03-OS1.2]
3.2.4.13.	**Vacuum Cleaning System Shutdown**
(1)	[F03-OS1.2]

Acceptable Solutions	Objectives and Functional Statements
3.2.4.14.	**Elevator Emergency Return**
(1)	[F10-OS1.5]
(2)	[F11-OS1.5]
(3)	[F02-OS1.2]
3.2.4.15.	**Sprinklers in Lieu of Fire Detectors**
(1)	[F02-OS1.2] [F11-OS1.5]
3.2.4.16.	**System Monitoring**
(1)	[F12-OS1.2] [F11, F12-OS1.5]
	[F12-OP1.2]
(2)	[F13-OS1.2] [F11, F13-OS1.5]
	[F13-OP1.2]
3.2.4.17.	**Manual Pull Stations**
(1)	[F11-OS1.5]
(2)	[F02, F12-OS1.2] [F10, F12-OS1.5]
(3)	[F02, F12-OS1.2] [F10, F12-OS1.5]
(4)	[F11-OS1.5]
(5)	[F11-OS1.5]
(6)	[F81-OS1.2] [F11, F81-OS1.5]
(7)	[F11-OS1.5]
(8)	
3.2.4.18.	**Alert and Alarm Signals**
(1)	
(2)	[F11-OS1.5]
(3)	[F11-OS1.5]
(4)	[F11-OS1.5]
(5)	
(6)	
3.2.4.19.	**Audibility of Alarm Systems**
(1)	[F11-OS1.5]
(2)	[F11-OS1.5]
(3)	[F11-OS1.5]
(4)	[F33-OS3.5]
(5)	[F11-OS1.5]
(6)	[F11-OS1.5]
(7)	[F11-OS1.5]
(8)	
(9)	[F11, F81-OS1.5]
(10)	[F11, F81-OS1.5]
(11)	[F11, F81-OS1.5]
(12)	[F11-OS1.5]
(13)	
(14)	[F11-OS1.5]
3.2.4.20.	**Visual Signals**
(1)	[F11-OS1.5]
(2)	[F11-OS1.5]
3.2.4.21.	**Smoke Alarms**
(1)	[F11, F81-OS1.5]
(2)	[F11-OS1.5]
(3)	[F11-OS1.5]
(4)	[F11-OS1.5]
(5)	[F11, F81-OS1.5]

Acceptable Solutions	Objectives and Functional Statements
(6)	[F11-OS1.5]
(7)	[F11, F81-OS1.5]
(8)	[F11, F81-OS1.5]
(9)	[F11-OS1.5]
3.2.4.22.	**Voice Communication Systems**
(1)	[F11, F12-OS3.7]
(2)	[F11-OS1.5]
(3)	[F13-OS1.4] [F11, F13-OS1.5]
(4)	[F11-OS1.5]
(5)	[F12-OS3.7]
3.2.5.1.	**Access to Above Grade Storeys**
(1)	[F12-OP1.2]
	[F12-OS1.2, OS1.5]
(2)	[F12-OP1.2]
	[F12-OS1.2, OS1.5]
(3)	[F12-OP1.2]
	[F12-OS1.2, OS1.5]
3.2.5.2.	**Access to Basements**
(1)	[F12-OP1.2]
	[F12-OS1.2, OS1.5]
(2)	[F12-OP1.2]
	[F12-OS1.2, OS1.5]
3.2.5.3.	**Roof Access**
(1)	[F12-OP1.2]
	[F12-OS1.2]
(2)	[F05, F06, F10, F12-OS3.7]
3.2.5.4.	**Access Routes**
(1)	[F12-OP1.2]
	[F12-OS1.2, OS1.5]
3.2.5.5.	**Location of Access Routes**
(1)	[F12-OP1.2]
	[F06-OS1.1] [F12-OS1.2, OS1.5]
(2)	[F12-OP1.2]
	[F12-OS1.2]
(3)	
(4)	[F12-OP1.2]
	[F12-OS1.2]
3.2.5.6.	**Access Route Design**
(1)	[F12-OP1.2]
	[F12-OS1.2]
3.2.5.7.	**Water Supply**
(1)	[F02-OP1.2]
	[F02-OP3.1]
	[F02-OS1.2]
(2)	
3.2.5.8.	Reserved
3.2.5.9.	Reserved
3.2.5.10.	Reserved
3.2.5.11.	Reserved
3.2.5.12.	Reserved

Acceptable Solutions	Objectives and Functional Statements
3.2.5.13.	**Automatic Sprinkler Systems**
(1)	[F02, F81, F82-OP1.2]
	[F02, F81, F82-OS1.2]
(2)	[F02, F81, F82-OP1.2]
	[F02, F81, F82-OS1.2]
(3)	[F02, F81, F82-OP1.2]
	[F02, F81, F82-OS1.2]
(4)	[F02-OP1.2]
	[F02-OS1.2]
(5)	[F81-OP1.2]
	[F81-OS1.2]
(6)	[F02-OP1.2]
	[F02-OS1.2]
(7)	[F02-OS1.2]
(8)	[F81-OS3.3, OS3.6]
3.2.5.14.	**Combustible Sprinkler Piping**
(1)	[F06-OP1.2]
	[F06-OS1.2]
(2)	[F02, F81-OP1.2]
	[F02, F81-OS1.2]
(3)	[F06-OP1.2]
	[F06-OS1.2]
(4)	[F06-OP1.2]
	[F06-OS1.2]
(5)	
3.2.5.15.	**Sprinklered Service Space**
(1)	[F02-OP1.2]
	[F02-OS1.2]
(2)	[F12-OP1.2]
	[F12-OS1.2]
(3)	[F12-OS1.2] [F11, F12-OS1.5]
	[F12-OP1.2]
(4)	[F02-OP1.2]
	[F02-OS1.2]
(5)	
3.2.5.16.	**Fire Department Connections**
(1)	[F12-OP1.2]
	[F12-OS1.2]
(2)	[F12-OP1.2]
	[F12-OS1.2]
(3)	[F12-OP1.2]
	[F12-OS1.2]
3.2.5.17.	**Portable Fire Extinguishers**
(1)	[F02, F12, F81-OP1.2]
	[F02, F12, F81-OS1.2]
(2)	[F12-OP1.2]
	[F12-OS1.2]
3.2.5.18.	**Protection from Freezing**
(1)	[F81-OP1.2]
	[F81-OS1.2]

Acceptable Solutions	Objectives and Functional Statements
3.2.5.19.	**Fire Pumps**
(1)	[F02, F81-OP1.2]
	[F02, F81-OS1.2]
3.2.6.1.	**Application**
(1)	
3.2.6.2.	**Limits to Smoke Movement**
(1)	[F02-OP1.2]
	[F02-OS1.2, OS1.5]
(2)	[F06-OP1.2]
	[F06-OS1.2] [F05, F06-OS1.5]
(3)	[F06-OP1.2]
	[F06-OS1.2] [F05, F06-OS1.5]
(4)	[F06, F12-OP1.2]
	[F06, F12-OS1.2, OS1.5]
3.2.6.3.	**Areas of Refuge**
(1)	[F10-OS1.5]
(2)	[F10-OS1.5]
(3)	[F10-OS1.5]
(4)	[F10-OS1.5]
3.2.6.4.	**Sprinklered Buildings**
(1)	(a) [F13, F82-OP1.2]
	(a) [F13, F82-OS1.2]
	(b) [F06-OP1.2]
	(b) [F06-OS1.2] [F05, F06-OS1.5]
	(c), (d) [F03-OP1.2]
	(c), (d) [F03-OS1.2, OS1.5]
3.2.6.5.	**Exception for Lower Buildings**
(1)	
3.2.6.6.	**Residential Buildings**
(1)	
(2)	
3.2.6.7.	**Connected Buildings**
(1)	[F03-OP1.2]
	[F03-OP3.1]
	[F03-OS1.2, OS1.5]
3.2.6.8.	**Emergency Operation of Elevators**
(1)	[F12-OP1.2]
	[F12-OS1.2, OS1.5]
(2)	[F12-OP1.2]
	[F12-OS1.2, OS1.5]
(3)	[F12-OP1.2]
	[F12-OS1.2, OS1.5]
(4)	[F12-OP1.2]
	[F12-OS1.2, OS1.5]
(5)	[F12-OP1.2]
	[F12-OS1.2, OS1.5]
(6)	[F12-OP1.2]
	[F12-OS1.2, OS1.5]
(7)	[F11-OS1.5]

Acceptable Solutions	Objectives and Functional Statements
3.2.6.9.	**Elevator for Use by Fire Fighters**
(1)	[F06, F12-OP1.2]
	[F06, F12-OS1.2, OS1.5]
(2)	[F12-OP1.2]
	[F12-OS1.2, OS1.5]
(3)	[F06-OP1.2]
	[F06-OS1.2, OS1.5]
(4)	[F12-OP1.2]
	[F12-OS1.2, OS1.5]
(5)	[F12-OP1.2]
	[F12-OS1.2,OS1.5]
(6)	[F06-OP1.2]
	[F06-OS1.2, OS1.5]
3.2.6.10.	**Venting to Aid Fire Fighting**
(1)	[F06-OP1.2]
	[F06-OS1.2, OS1.5]
(2)	[F06-OP1.2]
	[F06-OS1.2, OS1.5]
(3)	[F30-OS3.1]
(4)	[F12-OP1.2]
	[F12-OS1.2, OS1.5]
(5)	[F03, F12-OS1.2] [F12-OS1.5]
3.2.6.11.	**Reserved**
3.2.6.12.	**Central Alarm and Control**
(1)	[F12-OP1.2]
	[F12-OS1.2, OS1.5]
(2)	[F12-OP1.2]
	[F12-OS1.2] [F11, F12-OS1.5]
3.2.6.13.	**Voice Communication System**
(1)	[F11, F12-OS3.7]
3.2.6.14.	**Testing**
(1)	[F82-OP1.2]
	[F82-OS1.2, OS1.5]
3.2.7.1.	**Minimum Lighting Requirements**
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	
(3)	
(4)	[F30-OS3.1] [F10-OS3.7]
(5)	[F30-OS3.1] [F10-OS3.7]
(6)	[F30-OS3.1] [F10-OS3.7]
	[F40-OH2.4]
(7)	[F30-OS3.1] [F10-OS3.7]
	[F40-OH2.4]
3.2.7.2.	**Recessed Lighting Fixtures**
(1)	[F01-OP1.1, OP1.2]
	[F01-OS1.1, OS1.2]
3.2.7.3.	**Emergency Lighting**
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
(3)	[F30-OS3.1] [F10-OS3.7]
(4)	[F30-OS3.1] [F10-OS3.7]

Acceptable Solutions	Objectives and Functional Statements
3.2.7.4.	**Emergency Power for Lighting**
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30, F81-OS3.1] [F10, F81-OS3.7]
3.2.7.5.	**Emergency Power Supply Installation**
(1)	[F02, F03, F06, F10, F11, F12, F81-OS1.2, OS1.5]
	[F02, F06, F30, F81-OS3.1] [F10, F11, F12, F81-OS3.7]
	[F02, F03, F06, F81-OP1.2]
3.2.7.6.	**Emergency Power for Hospitals**
(1)	[F02, F03, F06, F10, F11, F12, F81-OS1.2, OS1.5]
	[F02, F06, F30, F81-OS3.1] [F10, F11, F12, F81-OS3.7]
	[F02, F03, F06, F81-OP1.2]
3.2.7.7.	**Fuel Supply Shut-off Valves and Exhaust Pipes**
(1)	[F12-OH5] Applies to the requirement for a suitably identified shut-off valve outside the *building*
	[F12-OP1.2] Applies to the requirement for a suitably identified shut-off valve outside the building
	[F12-OS1.1, OS1.2] Applies to the requirement for a suitably identified shut-off valve outside the building [F12-OS1.2, OS1.5] Applies to the requirement for a suitably identified separate shut-off valve
	[F81-OS3.1, OS3.7] Applies to the requirement for a suitably identified separate shut-off valve
(2)	[F03-OP1.2]
	[F03-OS1.2]
3.2.7.8.	**Emergency Power for Fire Alarm Systems**
(1)	[F13-OS1.2] [F11, F13-OS1.5]
	[F13-OP1.2] Applies to the requirement for fire alarm systems, including those with a voice communication system, to be provided with an emergency power supply.
(2)	[F13-OS1.2] [F11, F13-OS1.5]
	[F13-OP1.2]
(3)	[F13-OS1.2] [F11, F13-OS1.5]
	[F13-OP1.2]
(4)	[F13-OS1.2] [F11, F13-OS1.5]
	[F13-OP1.2]
3.2.7.9.	**Emergency Power for Building Services**
(1)	[F02, F03, F12-OP1.2]
	[F02, F03, F12-OS1.2, OS1.5]
	(a) [F36-OS3.6] [F10, F12-OS3.7]
	(b) [F02-OP3.1]
(2)	[F12-OP1.2]
	[F12-OS1.2, OS1.5]
	[F36-OS3.6] [F12-OS3.7]
(3)	
(4)	[F02, F03-OP1.2]
	[F02, F03-OS1.2, OS1.5]
	[F02-OP3.1]
(5)	
3.2.7.10.	**Protection of Electrical Conductors**
(1)	
(2)	[F06-OP1.2]
	[F06-OS1.2, OS1.5]
(3)	
(4)	[F06-OP1.2]
	[F06-OS1.2, OS1.5]
(5)	
(6)	

Acceptable Solutions	Objectives and Functional Statements
(7)	
(8)	
3.2.8.1.	**Application**
(1)	[F03, F06-OP1.2] [F03, F06-OS1.2] [F05-OS1.5]
(2)	
(3)	
(4)	
(5)	
3.2.8.2.	**Exceptions to Special Protection**
(1)	
(2)	
(3)	[F03-OP1.2] [F03-OS1.2]
(4)	
(5)	[F02, F03-OP1.2] [F02, F03-OS1.2]
(6)	
3.2.8.3.	**Configuration**
(1)	[F02, F03-OP1.2] [F02, F03-OS1.2]
(2)	
3.2.8.4.	**Exits**
(1)	[F06-OP1.2] [F06-OS1.2] [F05, F06-OS1.5]
(2)	[F06-OP1.2] [F06-OS1.2] [F05, F06-OS1.5]
(3)	[F06-OP1.2] [F06-OS1.2] [F05, F06-OS1.5]
(4)	
(5)	[F06-OS1.2] [F05, F06-OS1.5]
(6)	[F10-OS1.5]
(7)	[F10-OS1.5]
(8)	[F10-OS1.5]
3.2.8.5.	**Elevators**
(1)	[F06-OP1.2] [F06-OS1.2] [F05, F06-OS1.5]
(2)	
3.2.8.6.	**Group B Sleeping Rooms**
(1)	[F03, F06-OP1.2] [F06-OS1.2] [F05-OS1.5]
3.2.8.7.	**Sprinklers**
(1)	[F02, F04-OP1.2, OP1.3] [F02, F04-OS1.2, OS1.3]
(2)	
3.2.8.8.	**Fire Alarm and Detection System**
(1)	
3.2.8.9.	**Smoke**
(1)	
(2)	

Acceptable Solutions	Objectives and Functional Statements
(3)	(a) [F06-OP1.2]
	(a) [F06-OS1.2] [F05, F06-OS1.5]
(4)	[F06-OP1.2]
	[F06-OS1.2] [F05, F06-OS1.5]
(5)	
(6)	[F06-OP1.2]
	[F06-OS1.2] [F05, F06-OS1.5]
(7)	[F06-OP1.2]
	[F06-OS1.2] [F05, F06-OS1.5]
(8)	[F12-OP1.2]
	[F12-OS1.2, OS1.5]
3.2.8.10.	**Emergency Power Supply**
(1)	[F02, F03, F12-OP1.2]
	[F02, F03, F12-OS1.2, OS1.5]
3.2.8.11.	**Testing**
(1)	[F82-OP1.2]
	[F82-OS1.2, OS1.5]
3.2.9.1.	**Where Required**
(1)	[F02-OP1.2]
	[F02-OS1.2]
(2)	
(3)	
(4)	
(5)	
(6)	
(7)	
3.2.9.2.	**Standpipe System Design**
(1)	[F02, F81-OP1.2]
	[F02, F81-OS1.2]
(2)	[F12-OP1.2]
	[F12-OS1.2]
(3)	
(4)	[F02-OP1.2]
	[F02-OS1.2]
(5)	[F12-OP1.2]
	[F12-OS1.2]
(6)	[F12-OP1.2]
	[F12-OS1.2]
(7)	[F81-OP1.2]
	[F81-OS1.2]
(8)	[F81-OP1.2]
	[F81-OS1.2]
(9)	[F02, F81-OP1.2]
	[F02, F81-OS1.2]
3.2.9.3.	**Hose Connections**
(1)	[F02, F03-OP1.2]
	[F02, F03-OS1.2]
(2)	[F02, F03-OP1.2]
	[F02, F03-OS1.2]

Acceptable Solutions	Objectives and Functional Statements
3.2.9.4.	**Hose Stations**
(1)	[F02, F03-OP1.2]
	[F02, F03-OS1.2]
(2)	[F02-OP1.2]
	[F02-OS1.2]
(3)	[F81-OP1.2]
	[F81-OS1.2]
(4)	[F02, F03, F81-OP1.2]
	[F02, F03, F81-OS1.2]
	(c) [F12-OP1.2]
	(c) [F12-OS1.2]
(5)	[F02, F12-OP1.2]
	[F02, F12-OS1.2]
(6)	[F03-OP1.2]
	[F03-OS1.2]
(7)	
(8)	[F03-OP1.2]
	[F03-OS1.2]
(9)	[F10-OS1.5]
(10)	[F81-OP1.2]
	[F81-OS1.2]
3.2.9.5.	**Supervisory Signal Annunciation for Valves**
(1)	[F82-OP1.2]
	[F82-OS1.2]
3.2.9.6.	**Water Supply for 38 mm Hose Connections**
(1)	[F02-OP1.2]
	[F02-OS1.2]
3.2.9.7.	**Water Supply for 65 mm Hose Connections**
(1)	[F02-OP1.2]
	[F02-OS1.2]
(2)	
(3)	
(4)	
3.3.1.1.	**Separation of Suites**
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	[F02-OP1.2]
	[F02-OS1.2]
(3)	
3.3.1.2.	**Hazardous Substances, Equipment and Processes**
(1)	[F01, F02, F03-OP1.1, OP1.2]
	[F01, F02, F03-OS1.1, OS1.2]
	[F43-OS3.4]
(2)	
(3)	[F05-OS1.5]
	[F43-OS3.7]
3.3.1.3.	**Means of Egress**
(1)	
(2)	
(3)	[F10-OS3.7]
(4)	[F05, F06, F10, F12-OS3.7]

Acceptable Solutions	Objectives and Functional Statements
(5)	[F10, F12-OS3.7]
(6)	[F05, F06, F10, F12-OS3.7]
(7)	[F05, F06, F10, F12-OS3.7]
(8)	[F05-OS1.5]
(9)	[F05, F06, F10, F12-OS3.7]
(10)	
3.3.1.4.	**Public Corridor Separations**
(1)	[F06-OS1.2] [F03, F05, F06-OS1.5]
	[F03, F06-OP1.2]
(2)	[F06-OS1.2] [F03, F05, F06-OS1.5]
	[F03, F06-OP1.2]
(3)	[F06-OS1.2] [F03, F05, F06-OS1.5]
	[F03, F06-OP1.2]
(4)	(a), (b) [F06, F12-OS1.2] [F03, F05, F06, F10, F12-OS1.5]
	(a), (b) [F03, F06, F12-OP1.2]
	(c) [F03, F06-OS1.2] [F03, F05, F06-OS1.5]
	(c) [F03, F06-OP1.2]
(5)	
3.3.1.5.	**Egress Doorways**
(1)	[F05, F10-OS1.2]
(2)	[F05, F10-OS1.2]
(3)	
(4)	[F10-OS1.5]
3.3.1.6.	**Travel Distance**
(1)	[F10-OS1.5]
3.3.1.7.	**Protection on Floor Areas with a Barrier-Free Path of Travel**
(1)	[F05, F10-OS1.5]
	(a) [F06-OS1.5]
(2)	[F05, F10-OS1.5]
(3)	[F02-OP1.2]
	[F02-OS1.2]
(4)	[F03-OS1.2] [F06-OS1.5]
(5)	
(6)	[F03-OS1.2] [F06-OS1.5]
(7)	(a), (b) [F10, F73-OS1.5]
	(c), (d) [F10-OS1.5]
3.3.1.8.	**Headroom Clearance**
(1)	
3.3.1.9.	**Corridors**
(1)	[F10, F12-OS3.7]
(2)	[F10, F12-OS3.7]
(3)	[F30, F73-OS3.1]
(4)	
(5)	[F10, F12-OS3.7]
(6)	(a) [F10, F12-OS3.7]
	(b) [F06-OS1.2] [F05, F06-OS1.5]
(7)	
(8)	[F10-OS3.7]
(9)	[F10-OS3.7]
(10)	[F10-OS1.5]

Acceptable Solutions	Objectives and Functional Statements
(11)	[F10-OS1.5] [F10-OS3.7]
(12)	[F10-OS1.5] [F10-OS3.7]
(13)	[F10-OS1.5] [F10-OS3.7]
(14)	[F10-OS3.7]
(15)	
3.3.1.10.	Door Swing
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
(3)	[F10-OS3.7]
(4)	[F10-OS3.7]
3.3.1.11.	Sliding Doors
(1)	(b) [F10-OS3.7]
(2)	
(3)	
3.3.1.12.	Doors and Door Hardware
(1)	(a), (b) [F10, F12-OS3.7] (c) [F30-OS3.1] [F10-OS3.7]
(2)	[F10-OS3.7]
(3)	[F10-OS3.7]
(4)	[F10-OS3.7]
(5)	[F10-OS3.7] [F73-OA1]
(6)	
(7)	[F12-OS3.7]
(8)	[F12-OS3.7]
(9)	[F12-OS3.7]
(10)	
(11)	
(12)	
3.3.1.13.	Ramps and Stairways
(1)	
(2)	
3.3.1.14.	Exterior Passageways
(1)	
3.3.1.15.	Curved or Spiral Stairs
(1)	
3.3.1.16.	Capacity of Access to Exits
(1)	
(2)	[F10-OS3.7]
(3)	[F10-OS3.7]
(4)	
(5)	
3.3.1.17.	Guards
(1)	[F30-OS3.1]
(2)	[F30-OS3.1]
(3)	
(4)	[F30-OS3.1]
(5)	[F30-OS3.1]

Acceptable Solutions	Objectives and Functional Statements
(6)	
3.3.1.18.	**Transparent Doors and Panels**
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F20-OS3.1]
(3)	[F30-OS3.1] [F10-OS3.7]
(4)	
(5)	
(6)	[F30-OS3.1]
3.3.1.19.	**Exhaust Ventilation**
(1)	[F01-OS1.1]
(2)	[F02-OP1.3] Applies to the requirement for explosion-relief devices and vents
	[F02-OS1.3] Applies to the requirement for explosion-relief devices and vents
3.3.1.20.	**Janitors' Rooms**
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	
(3)	[F02-OP1.2]
	[F02-OS1.2]
3.3.1.21.	**Common Laundry Rooms**
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	
(3)	[F02-OP1.2]
	[F02-OS1.2]
3.3.1.22.	**Obstructions**
(1)	[F10-OS3.7]
3.3.1.23.	**Signs in Service Spaces**
(1)	[F10-OS3.7]
3.3.1.24.	**Welding and Cutting**
(1)	[F02, F03-OP1.2]
	[F02, F03-OS1.2]
(2)	
3.3.2.1.	**Scope**
(1)	
3.3.2.2.	**Fire Separations**
(1)	[F03-OS1.2]
(2)	
(3)	[F03-OS1.2] Applies where space under tiers of seats is sprinklered
	[F03-OS1.2] Applies where space under tiers of seats is not sprinklered
(4)	[F03-OS1.2]
	[F03-OP1.2]
(5)	[F03-OS1.2]
	[F03-OP1.2]
(6)	
(7)	[F03-OS1.2]
	[F03-OP1.2]
(8)	[F03-OS1.2]
(9)	[F03-OS1.2]
	[F03-OP1.2]
3.3.2.3.	**Fixed Seats**
(1)	[F30-OS3.1] [F10-OS3.7]

Acceptable Solutions	Objectives and Functional Statements
(2)	
(3)	[F10-OS3.7]
(4)	
(5)	
(6)	
3.3.2.4.	**Aisles**
(1)	
(2)	
(3)	[F10-OS3.7]
(4)	[F10-OS3.7]
(5)	[F10-OS3.7]
(6)	
(7)	[F10-OS3.7]
(8)	[F10-OS3.7]
(9)	[F10-OS3.7]
(10)	[F10-OS3.7]
(11)	[F10-OS3.7]
(12)	[F10-OS3.7]
(13)	[F03-OS1.2] [F10-OS3.7]
(14)	[F03-OS1.2] [F10-OS3.7]
(15)	[F10-OS3.7]
(16)	[F10-OS3.7]
(17)	[F10-OS3.7]
(18)	[F30-OS3.1] [F10-OS3.7]
(19)	[F30-OS3.1] [F10-OS3.7]
(20)	[F30-OS3.1] [F10-OS3.7]
(21)	[F30-OS3.1] [F10-OS3.7]
(22)	[F30-OS3.1] [F10-OS3.7]
(23)	[F30-OS3.1] [F10-OS3.7]
(24)	[F30-OS3.1] [F10-OS3.7]
(25)	[F30-OS3.1] [F10-OS3.7]
(26)	[F30-OS3.1] [F10-OS3.7]
(27)	
3.3.2.5.	**Corridors**
(1)	[F06-OS1.2] [F03, F05, F06-OS1.5] [F03, F06-OP1.2]
(2)	
(3)	[F06-OS1.2] [F03, F05, F06-OS1.5] [F03, F06-OP1.2]
(4)	[F10-OS3.7]
3.3.2.6.	**Doors**
(1)	[F10-OS3.7]
3.3.2.7.	**Fixed Bench-Type Seats without Arms**
(1)	[F10-OS3.7] [F10-OS3.7]
(2)	
(3)	
3.3.2.8.	**Guards**
(1)	

Acceptable Solutions	Objectives and Functional Statements
(2)	
(3)	
(4)	
3.3.2.9.	**Outdoor Places of Assembly**
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
(3)	[F10-OS3.7]
(4)	
(5)	[F10-OS3.7]
3.3.2.10.	**Bleachers**
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
(3)	
(4)	[F30-OS3.1] [F10-OS3.7]
(5)	[F30-OS3.1]
3.3.2.11.	**Libraries**
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	[F02-OP1.2]
	[F02-OS1.2]
(3)	
3.3.2.12.	**Stages for Theatrical Performances**
(1)	[F02-OP1.2]
	[F02-OS1.2]
(2)	[F03-OP1.2]
	[F03-OS1.2]
(3)	[F03-OP1.2]
	[F03-OS1.2]
(4)	[F03-OP1.2]
	[F03-OS1.2]
(5)	[F02, F06-OS1.2] [F06-OS1.5]
	[F02, F06-OP1.2]
(6)	[F03-OP1.2]
	[F03-OS1.2, OS1.5]
3.3.2.13.	**Risers for Stairs**
(1)	[F30-OS3.1]
3.3.3.1.	**Scope**
(1)	
3.3.3.2.	**Fire Separations**
(1)	[F03-OS1.2]
	[F44-OS3.4]
(2)	[F03-OS1.2]
	[F03-OP1.2]
(3)	[F03-OS1.5]
	[F03-OP1.2]
(4)	
(5)	
3.3.3.3.	**Corridors**
(1)	[F10-OS3.7]
(2)	[F10, F12-OS3.7]

Acceptable Solutions	Objectives and Functional Statements
(3)	[F10-OS1.5]
	[F10, F12-OS3.7]
(4)	(a) [F10-OS3.7]
	(b) [F10, F12-OS3.7]
(5)	
3.3.3.4.	**Doorway Width**
(1)	[F10, F12-OS3.7]
3.3.3.5.	**Hospitals and Nursing Homes**
(1)	
(2)	[F06-OS1.2] [F05, F06-OS1.5]
	[F06-OP1.2]
(3)	
(4)	[F03, F06-OP1.2]
	[F05, F06-OS1.2] [F06-OS1.5]
(5)	
(6)	[F06-OS1.2] [F06-OS1.5]
(7)	[F10-OS1.5]
(8)	[F10-OS1.5]
(9)	[F03, F05-OS1.2] [F06-OS1.5]
(10)	
(11)	
(12)	[F03, F05-OS1.2] [F06-OS1.5]
3.3.3.6.	**Protection for Special Care and Treatment Facilities**
(1)	[F03-OS1.2]
3.3.3.7.	**Contained Use Areas**
(1)	
(2)	[F03, F06-OS1.2] [F06-OS1.5]
	[F03, F06-OP1.2]
(3)	[F02, F06-OS1.2] [F06-OS1.5]
	[F02, F06-OP1.2]
(4)	[F02, F06-OS1.2] [F06-OS1.5]
	[F02, F06-OP1.2]
(5)	[F10-OS3.7]
3.3.3.8.	**Handrails**
(1)	[F30-OS3.1]
	[F73-OA1]
3.3.4.1.	**Scope**
(1)	
3.3.4.2.	**Fire Separations**
(1)	[F03, F06-OS1.2] [F05, F06-OS1.5]
	[F03, F06-OP1.2]
(2)	
(3)	
(4)	[F44-OS1.1] [F02, F03-OS1.2]
	(a), (b) [F02, F03-OP1.2]
(5)	[F01-OS1.1] [F03-OS1.2]
	[F44-OS3.4]
	(a) [F03-OP1.2]
3.3.4.3.	**Storage Rooms**
(1)	[F02-OP1.2]
	[F02-OS1.2]

Acceptable Solutions	Objectives and Functional Statements
(2)	[F03-OP1.2]
	[F03-OS1.2]
(3)	
3.3.4.4.	**Egress from Dwelling Units**
(1)	
(2)	[F05, F10-OS3.7]
(3)	[F10-OS3.7]
(4)	[F05-OS1.2, OS1.5]
(5)	[F05-OS1.5]
(6)	[F05, F10-OS3.7]
(7)	[F05, F10-OS3.7]
(8)	[F05-OS1.2]
	[F10-OS3.7]
3.3.4.5.	**Automatic Locking Prohibition**
(1)	[F10-OS3.7]
3.3.4.6.	**Sound Transmission**
(1)	
3.3.4.7.	**Stairs, Handrails and Guards for Dwelling Units**
(1)	
3.3.5.1.	**Scope**
(1)	
3.3.5.2.	**Fire Extinguishing Systems**
(1)	[F03-OP1.2]
	[F03-OS1.2]
3.3.5.3.	**Basements**
(1)	[F12-OP1.2]
	[F01-OS1.1] [F12-OS1.2, OS1.5]
(2)	[F06-OS1.2] [F05, F06-OS1.5] Applies to the separation of *exits* from the remainder of the *building*. [F06-OS1.2, OS1.5] Applies to the separation of entrances to *basements* and to rooms containing *building* services from the remainder of the *building*.
	[F06-OP1.2] Applies to the separation of exits from the remainder of the *building*. [F06-OP1.2] Applies to the separation of entrances from the remainder of the *building*.
(3)	[F44-OS1.*]
3.3.5.4.	**Repair and Storage Garages**
(1)	
(2)	[F30-OS3.1] [F10, F12-OS3.7]
(3)	
(4)	
(5)	[F30-OS3.1]
(6)	[F30-OS3.1]
(7)	[F02-OP1.2]
	[F02-OS1.2]
3.3.5.5.	**Repair Garage Separation**
(1)	[F03-OP1.2]
	[F03-OS1.2]
3.3.5.6.	**Storage Garage Separation**
(1)	[F03-OP1.2]
	[F03-OS1.2]
3.3.5.7.	**Vestibules**
(1)	
(2)	

Acceptable Solutions	Objectives and Functional Statements
(3)	[F44-OS1.1]
	[F44-OS3.4]
3.3.5.8.	**Toe-Boards Required**
(1)	[F30-OS3.1]
3.4.1.1.	**Scope**
(1)	
3.4.1.2.	**Separation of Exits**
(1)	[F05, F06, F10, F12-OS3.7]
	[F06, F12-OP1.2]
	[F06, F12-OS1.2, OS1.5]
(2)	[F10-OS3.7]
3.4.1.3.	**Access to Exits**
(1)	
3.4.1.4.	**Types of Exit**
(1)	
3.4.1.5.	**Exterior Exit Passageways**
(1)	[F10-OS3.7]
(2)	
3.4.1.6.	**Restricted Use of Horizontal Exits**
(1)	[F10-OS3.7]
(2)	[F05, F10-OS3.7]
(3)	
3.4.1.7.	**Slide Escapes**
(1)	[F10-OS3.7]
3.4.1.8.	**Transparent Doors and Panels**
(1)	
3.4.1.9.	**Mirrors near Exits**
(1)	[F30-OS3.1] [F10-OS3.7]
3.4.1.10.	**Combustible Glazing in Exits**
(1)	[F03, F06-OP1.2]
	[F05, F06-OS1.2] [F06-OS1.5]
3.4.1.11.	**Exterior Stairway for Nursing Home**
(1)	[F10-OS3.1, OS3.7]
3.4.2.1.	**Minimum Number of Exits**
(1)	[F05, F06, F10, F12-OS3.7]
	[F06, F12-OP1.2]
	[F06, F12-OS1.2]
(2)	
(3)	[F10-OS3.7]
(4)	
(5)	
(6)	[F10-OS3.7]
(7)	
3.4.2.2.	**Mezzanine Exiting**
(1)	[F05-OS1.5]
(2)	
(3)	
(4)	
3.4.2.3.	**Distance between Exits**
(1)	[F05, F10-OS1.5]
(2)	

Acceptable Solutions	Objectives and Functional Statements
(3)	
3.4.2.4.	**Travel Distance**
(1)	
(2)	
(3)	[F10-OS3.7]
(4)	
3.4.2.5.	**Location of Exits**
(1)	[F10-OS3.7]
(2)	
(3)	[F10-OS3.7]
3.4.2.6.	**Principal Entrance**
(1)	[F10-OS3.7]
3.4.3.1.	**Exit Width Based on Occupant Load**
(1)	
(2)	[F10-OS3.7]
3.4.3.2.	**Exit Width**
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
(3)	[F10-OS3.7]
(4)	
(5)	
(6)	[F10-OS3.7]
(7)	[F12-OP1.2]
	[F12-OS1.2]
	[F30-OS3.1] [F10, F12-OS3.7]
3.4.3.3.	**Exits from Interconnected Floor Space**
(1)	
3.4.3.4.	**Exit Width Reduction**
(1)	[F12-OS1.2]
	[F30-OS3.1] [F10, F12-OS3.7]
	[F12-OP1.2]
(2)	[F12-OS1.2]
	[F10, F12-OS3.7]
	[F12-OP1.2]
(3)	[F12-OS1.2]
	[F10, F12-OS3.7]
	[F12-OP1.2]
(4)	[F12-OS1.2]
	[F10, F12-OS3.7]
	[F12-OP1.2]
(5)	[F12-OS1.2]
	[F10, F12-OS3.7]
	[F12-OP1.2]
3.4.3.5.	**Headroom Clearance**
(1)	[F12-OP1.2]
	[F12-OS1.2]
	[F30-OS3.1] [F10, F12-OS3.7]
(2)	
(3)	[F12-OP1.2]
	[F12-OS1.2]
	[F30-OS3.1] [F10, F12-OS3.7]

Acceptable Solutions	Objectives and Functional Statements
(4)	[F12-OP1.2]
	[F12-OS1.2]
	[F30-OS3.1] [F10, F12-OS3.7]
3.4.4.1.	**Fire-Resistance Rating of Exit Separations**
(1)	[F03, F06-OS1.2] [F05, F06-OS1.5]
	[F03, F06-OP1.2]
(2)	
(3)	
(4)	
3.4.4.2.	**Exits through Lobbies**
(1)	[F05, F06-OS1.5]
(2)	[F05, F06, F10, F12-OS1.5]
3.4.4.3.	**Exterior Passageway Exceptions**
(1)	[F05, F06, F10-OS1.5]
3.4.4.4.	**Integrity of Exits**
(1)	[F03, F06-OS1.2] [F05, F06-OS1.5]
	[F03, F06-OP1.2]
(2)	[F06-OS1.2] [F05, F06-OS1.5]
	[F06-OP1.2]
(3)	[F06-OS1.2] [F05, F06-OS1.5]
	[F06-OP1.2]
(4)	[F06-OS1.2] [F05, F06-OS1.5]
	[F43-OS3.7]
	[F06-OP1.2]
(5)	[F03, F06-OP1.2]
	[F03, F06-OS1.2] [F05, F06-OS1.5]
(6)	[F12-OS1.2] [F05, F10, F12-OS1.5]
	[F30-OS3.1] [F31-OS3.2] [F32-OS3.3] [F43-OS3.4] [F10, F12-OS3.7]
	[F12-OP1.2]
(7)	[F06-OS1.2] [F05, F06-OS1.5]
	[F06-OP1.2]
	[F43-OS3.7]
(8)	[F06-OS1.2] [F05, F06-OS1.5]
	[F06-OP1.2]
(9)	[F06-OS1.2] [F05, F06-OS1.5]
	[F06-OP1.2]
(10)	[F81-OS1.5]
	[F81-OS3.7]
	[F81-OP1.2]
3.4.5.1.	**Exit Signage**
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
(3)	[F10-OS3.7]
(4)	[F10, F81-OS3.7]
(5)	[F10-OS3.7]
(6)	[F10-OS3.7]
(7)	[F10-OS3.7]
(8)	
(9)	
3.4.5.2.	**Signs within Exit Facilities**
(1)	[F10-OS3.7]

Acceptable Solutions	Objectives and Functional Statements
(2)	[F10-OS3.7]
3.4.6.1.	**Slip Resistance of Ramps and Stairs**
(1)	(a) [F30-OS3.1] [F10-OS3.7]
	(b) [F30-OS3.1] [F10-OS3.7]
(2)	[F12-OS1.2, OS1.5]
	[F30-OS3.1] [F10, F12-OS3.7]
	[F12-OP1.2]
3.4.6.2.	**Minimum Number of Risers**
(1)	[F30-OS3.1]
3.4.6.3.	**Landings and Maximum Vertical Rise of Stair Flights**
(1)	[F10-OS3.7]
(2)	[F12-OS1.2, OS1.5]
	[F30-OS3.1] [F10, F12-OS3.7]
	[F12-OP1.2]
(3)	[F30-OS3.1] [F10, F12-OS3.7]
(4)	[F30-OS3.1] [F10, F12-OS3.7]
(5)	[F30-OS3.1] [F10, F12-OS3.7]
(6)	
3.4.6.4.	**Handrails**
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
(3)	[F30-OS3.1] [F10-OS3.7]
(4)	[F30-OS3.1] [F10-OS3.7]
(5)	[F30-OS3.1] [F10-OS3.7]
(6)	[F30-OS3.1] [F10-OS3.7]
(7)	[F30-OS3.1] [F10-OS3.7]
	[F73-OA1]
(8)	[F30-OS3.1] [F10-OS3.7]
(9)	[F20-OS3.1, OS3.7]
(10)	[F30-OS3.1] [F10-OS3.7]
(11)	[F30-OS3.1]
	[F73-OA1]
3.4.6.5.	**Guards**
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
(3)	[F30-OS3.1] [F10-OS3.7]
(4)	[F30-OS3.1] [F10-OS3.7]
(5)	[F30-OS3.1]
(6)	
(7)	[F30-OS3.1]
(8)	[F30-OS3.1]
3.4.6.6.	**Ramp Slope**
(1)	[F30-OS3.1] [F10-OS3.7]
3.4.6.7.	**Treads and Risers**
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
(3)	[F30-OS3.1] [F10-OS3.7]
(4)	[F30-OS3.1]
(5)	[F30-OS3.1] [F10-OS3.7]
(6)	[F30-OS3.1]

Acceptable Solutions	Objectives and Functional Statements
3.4.6.8.	**Curved Stairs**
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
3.4.6.9.	**Horizontal Exits**
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
(3)	
(4)	[F10, F73-OS3.7]
(5)	[F10-OS3.7]
(6)	
(7)	[F10-OS1.5]
3.4.6.10.	**Doors**
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7] Applies to portion of Code text: "No *exit* door shall open directly onto a step..."
	[F10, F81-OS3.7] Applies where there is a danger of blockage from ice or snow.
(3)	[F10-OS3.7]
(4)	[F10, F12-OS3.7]
3.4.6.11.	**Direction of Door Swing**
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
(3)	
3.4.6.12.	**Self-Closing Devices**
(1)	[F06-OS1.2] [F05, F06-OS1.5]
	[F03, F06-OP1.2]
3.4.6.13.	**Sliding Doors**
(1)	
(2)	[F12-OS3.7]
3.4.6.14.	**Revolving Doors**
(1)	(a) [F30-OS3.1] [F10-OS3.7]
	(b) [F10, F12-OS3.7]
	(c) [F10-OS3.7]
	(d) [F30-OS3.1] [F10-OS3.7]
	(e) [F20-OS3.1]
(2)	[F10-OS3.7]
(3)	(a), (b), (d), (e) [F20, F30-OS3.1] [F10, F81-OS3.7]
3.4.6.15.	**Door Release Hardware**
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
(3)	[F10-OS3.7]
(4)	[F10, F81-OS3.7]
	[F10, F81-OS3.7]
(5)	[F10-OS3.7]
(6)	
(7)	[F02-OS1.2]
	[F10-OS3.7]
(8)	[F10-OS3.7]
	[F73-OA1]
3.4.6.16.	**Reserved**

Acceptable Solutions	Objectives and Functional Statements
3.4.6.17.	**Emergency Access to Floor Areas**
(1)	(a), (b) [F10-OS3.7]
	(c) [F12-OP1.2]
	(c) [F12-OS1.2, OS1.5]
	(c) [F12-OS3.7]
(2)	[F10-OS3.7]
(3)	
(4)	
3.4.6.18.	**Floor Numbering**
(1)	[F12-OS1.2]
	[F10, F12, F73-OS3.7]
	[F12-OP1.2]
	[F73-OA1]
(2)	[F12-OS1.2]
	[F10, F12, F73-OS3.7]
	[F12-OP1.2]
	[F73-OA1]
3.4.7.1.	**Scope**
(1)	[F10, F12-OS3.7]
(2)	[F12-OS1.2] [F10-OS1.5]
	[F30-OS3.1] [F10-OS3.7]
3.4.7.2.	**Fire Escape Construction**
(1)	[F06-OS1.2] [F05-OS1.5] Applies to the combustibility of materials used in the construction of fire escapes.
	[F20-OS3.1] [F10, F12-OS3.7] Applies to the type and construction of fire escapes.
	[F20-OS2.1] Applies to the type and construction of fire escapes.
3.4.7.3.	**Access to Fire Escapes**
(1)	[F10-OS3.7] Applies to portion of Code text: "Access to fire escapes shall be from corridors through doors at floor level ..."
(2)	[F30-OS3.1] [F10-OS3.7]
3.4.7.4.	**Protection of Fire Escapes**
(1)	[F05, F06-OS1.5]
(2)	
3.4.7.5.	**Stairs**
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
(3)	[F10-OS3.7] Applies to the reduction in width permitted under certain conditions.
(4)	[F30-OS3.1] [F10-OS3.7]
3.4.7.6.	**Guards and Railings**
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
(3)	[F30-OS3.1] [F10-OS3.7]
(4)	[F30-OS3.1]
(5)	[F30-OS3.1]
3.4.7.7.	**Landings**
(1)	
3.5.1.1.	**Scope**
(1)	
(2)	
3.5.2.1.	**Required Elevator**
(1)	[F12-OS3.7]
	[F73-OA1]

Acceptable Solutions	Objectives and Functional Statements
3.5.2.2.	**Barrier-Free Design**
	[F73-OA1]
(1)	
3.5.3.1.	**Fire Separations for Elevator Hoistways**
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	
(3)	[F06-OP1.2]
	[F06-OS1.2] [F05, F06-OS1.5]
3.5.3.2.	**Vertical Service Spaces for Dumbwaiters**
(1)	[F03-OP1.2]
	[F03-OS1.2]
3.5.3.3.	**Fire Separations for Elevator Machine Rooms**
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	[F03-OP1.2]
	[F03-OS1.2]
3.5.4.1.	**Elevator Car Dimensions**
(1)	[F12-OS3.7]
(2)	[F12-OS3.7]
3.6.1.1.	**Scope**
(1)	
(2)	
3.6.1.2.	**Reserved**
3.6.1.3.	**Storage Use Prohibition**
(1)	[F01-OS1.1] [F02-OS1.2]
3.6.1.4.	**Reserved**
3.6.1.5.	**Fixed Access Ladders**
(1)	[F20-OS2.1]
	[F30-OS3.1]
3.6.2.1.	**Fire Separations around Service Rooms**
(1)	[F03-OP1.2, OP1.4]
	[F03-OS1.2, OS1.4]
(2)	
(3)	[F01-OP1.1] [F03-OP1.2]
	[F01-OS1.1] [F03-OS1.2]
(4)	[F03-OP1.2, OP1.4]
	[F03-OS1.2, OS1.4]
(5)	[F03-OP1.2, OP1.4]
	[F03-OS1.2, OS1.4]
(6)	[F03-OP1.2, OP1.4]
	[F03-OS1.2, OS1.4]
(7)	[F03-OP1.2, OP1.4]
	[F03-OS1.2, OS1.4]
(8)	
(9)	
(10)	
(11)	
3.6.2.2.	**Service Rooms under Exits**
(1)	[F02-OS1.2]
	[F05, F06-OS3.7]

Acceptable Solutions	Objectives and Functional Statements
3.6.2.3.	**Service Equipment**
(1)	
3.6.2.4.	**Incinerator Rooms**
(1)	[F02-OS1.2]
3.6.2.5.	**Combustible Refuse Storage**
(1)	[F03-OP1.2]
	[F03-OS1.2]
3.6.2.6.	**Door Swing for Service Rooms**
(1)	[F10-OS1.5] Applies to portion of Code text: "A swing-type door from a *service room* containing a *boiler* or incinerator shall swing outward from the room ..."
	[F30-OS3.1] Applies to portion of Code text: "A swing-type door from a *service room* containing a *boiler* or incinerator shall swing ... inward if the door opens onto a corridor or any room used for an *assembly occupancy*."
3.6.2.7.	**Electrical Equipment Vaults**
(1)	[F03-OP1.2, OP1.4]
	[F03-OS1.2, OS1.4]
(2)	[F02-OP1.2] [F03-OP1.4]
	[F02-OS1.2] [F03-OS1.4] [F11-OS1.5]
(3)	[F03-OP1.2, OP1.4]
	[F03-OS1.2, OS1.4]
(4)	[F02-OS1.2, OS1.3]
	[F22-OS2.3]
	[F02-OP1.2, OP1.3]
	[F22-OP2.3]
(5)	[F03-OP1.2, OP1.4]
	[F03-OS1.2, OS1.4]
(6)	
(7)	[F32-OS3.3]
	[F34-OS4.1]
(8)	[F02-OS1.2, OS1.3]
	[F02-OP1.2, OP1.3]
(9)	[F81-OS1.1]
(10)	[F81-OS1.1]
(11)	[F81-OS1.1]
(12)	[F81-OS1.1]
	(b) [F30-OS3.1]
	(d) [F03-OS1.2]
	(d) [F03-OP1.2]
(13)	[F81-OS1.1]
	[F34-OS3.3]
	[F81-OP1.1]
(14)	[F01-OS1.1] [F03-OS1.2]
	[F01-OP1.1] [F03-OP1.2]
(15)	[F01-OS1.1] [F03-OS1.2]
	[F01-OP1.1] [F03-OP1.2]
3.6.2.8.	**Emergency Power Installations**
(1)	[F03, F06-OS1.2] [F03-OS1.4] [F06-OS1.5]
	[F03, F06-OP1.2] [F03-OP1.4]
3.6.2.9.	**Storage of Oxygen Containers**
(1)	[F01-OS1.1] [F03-OS1.2]
	[F43-OS3.4]
	[F01-OP1.1] [F03-OP1.2]

Acceptable Solutions	Objectives and Functional Statements
3.6.3.1.	**Fire Separations for Vertical Service Spaces**
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	[F03-OP1.2]
	[F03-OS1.2]
(3)	[F03-OP1.2]
	[F03-OS1.2]
(4)	[F03-OP1.2]
	[F03-OS1.2]
(5)	[F03-OP1.2]
	[F03-OS1.2]
3.6.3.2.	**Foamed Plastic Protection**
(1)	[F02-OS1.2]
3.6.3.3.	**Linen and Refuse Chutes**
(1)	(a), (b), (c) [F41-OH2.4, OH2.5]
	(d), (e) [F02-OS1.2]
(2)	[F03-OP1.2]
	[F03-OS1.2]
(3)	[F03-OS1.2]
(4)	(a) [F41-OH2.4, OH2.5]
	(b) [F03-OS1.2]
(5)	(a) [F03, F81-OP1.2]
	(a) [F03, F81-OS1.2]
	(a) [F41, F81-OH2.4, OH2.5]
	(b) [F03-OP1.2]
	(b) [F03-OS1.2]
	(c) [F01, F02-OP1.2]
	(c) [F01, F02-OS1.2]
	(d) [F06-OS1.2] [F05, F06-OS1.5]
	(d) [F06-OP1.2]
(6)	[F02-OP1.2]
	[F02-OS1.2]
(7)	[F03-OP1.2]
	[F03-OS1.2]
(8)	[F02-OS1.2]
	[F41-OH2.4, OH2.5]
(9)	[F03-OP1.2]
	[F03-OS1.2]
(10)	[F41-OH2.4, OH2.5] Applies to portion of Code text: "The room or bin into which a refuse chute discharges shall be ... impervious to moisture and be equipped with a water connection and floor drain for washing-down purposes."
	[F03, F81-OS1.2] Applies to portion of Code text: "The room or bin into which a refuse chute discharges shall be of sufficient size to contain the refuse between normal intervals of emptying ..."
	[F41, F81-OH2.4, OH2.5] Applies to portion of Code text: "The room or bin into which a refuse chute discharges shall be of sufficient size to contain the refuse between normal intervals of emptying ..."
(11)	[F01, F02-OS1.2]
3.6.3.4.	**Exhaust Duct Negative Pressure**
(1)	
3.6.4.1.	**Scope**
(1)	
3.6.4.2.	**Fire Separations for Horizontal Service Spaces**
(1)	

Acceptable Solutions	Objectives and Functional Statements
(2)	[F03-OP1.2]
	[F03-OS1.2]
3.6.4.3.	**Plenum Requirements**
(1)	[F02-OS1.2]
(2)	[F03-OP1.2]
	[F03-OS1.2]
(3)	[F43-OH5]
3.6.4.4.	**Attic or Roof Space Access**
(1)	[F01, F02, F12-OP1.2]
	[F01, F02, F12-OS1.2]
3.6.4.5.	**Horizontal Service Space Access**
(1)	[F01, F02, F12-OP1.2]
	[F01, F02, F12-OS1.2]
3.6.4.6.	**Crawl Space Access**
(1)	[F01, F02, F12-OP1.2]
	[F01, F02, F12-OS1.2]
3.7.1.1.	**Room and Space Height**
(1)	[F30-OS3.1]
(2)	
3.7.1.2.	**Residential Room Dimensions**
(1)	
3.7.1.3.	**Sleeping Areas in Group B and Child Care Facilities**
(1)	(c) [F30-OS3.1]
(2)	
(3)	[F30-OS3.1] Applies to portion of Code text: "with not less than 2 300 mm ceiling height over the entire room area."
3.7.1.4.	**Sleeping Areas in Camps**
(1)	
(2)	
3.7.2.1.	**Window Areas**
(1)	[F102-OH7]
(2)	[F102-OH7]
(3)	[F102-OH7]
3.7.2.2.	**Window Protection in Apartment**
(1)	
(2)	[F30-OS3.1]
(3)	[F30-OS3.1]
(4)	
3.7.4.1.	**Plumbing and Drainage Systems**
(1)	[F72-OH2.1] [F70-OH2.2] [F71-OH2.3]
(2)	[F72-OH2.1]
(3)	
3.7.4.2.	**Plumbing Fixtures, General**
(1)	
(2)	[F72-OH2.1] Applies to portion of Code text: "water closets shall be provided"
(3)	
(4)	
(5)	[F71-OH2.3]
(6)	
(7)	[F74-OA2]
(8)	

Acceptable Solutions	Objectives and Functional Statements
(9)	[F30-OS3.1]
(10)	[F71-OH2.3]
3.7.4.3.	**Plumbing Fixtures for Assembly Occupancies**
(1)	[F72-OH2.1]
(2)	[F72-OH2.1]
(3)	[F72-OH2.1]
(4)	[F72-OH2.1]
(5)	[F72-OH2.1]
(6)	[F72-OH2.1] [F71-OH2.3]
(7)	[F72-OH2.1]
(8)	[F72-OH2.1]
	(b) [F101-OH6]
(9)	
(10)	[F72-OH2.1]
(11)	[F72-OH2.1]
(12)	[F72-OH2.1]
(13)	[F72-OH2.1]
(14)	[F72-OH2.1]
(15)	[F72-OH2.1]
(16)	[F72-OH2.1]
3.7.4.4.	**Plumbing Fixtures for Care or Detention Occupancies**
(1)	[F72-OH2.1] [F71-OH2.3]
(2)	[F72-OH2.1] [F71-OH2.3]
(3)	[F72-OH2.1]
3.7.4.5.	**Plumbing Facilities for Dwelling Units**
(1)	[F72-OH2.1] [F70-OH2.2] [F71-OH2.3]
3.7.4.6.	**Plumbing Fixtures for Other Residential Occupancies**
(1)	[F72-OH2.1]
(2)	[F72-OH2.1]
(3)	[F71-OH2.3]
(4)	[F50-OH1.1]
	[F71-OH2.3]
3.7.4.7.	**Plumbing Fixtures for Business and Personal Services Occupancies**
(1)	[F72-OH2.1]
(2)	
3.7.4.8.	**Plumbing Fixtures for Mercantile Occupancies**
(1)	[F72-OH2.1]
(2)	[F72-OH2.1]
(3)	
(4)	[F72-OH2.1] [F71-OH2.3]
3.7.4.9.	**Plumbing Fixtures for Industrial Occupancies**
(1)	[F72-OH2.1]
(2)	
3.7.4.10.	**Plumbing Fixtures for Mobile Home Facilities**
(1)	[F72-OH2.1] [F71-OH2.3]
(2)	[F72-OH2.1]
(3)	[F71-OH2.3] Applies to the minimum number of laundry trays or similar facilities, and of bathtubs or showers for each sex.
3.7.4.11.	**Safety Glass**
(1)	[F20-OS3.1]

Acceptable Solutions	Objectives and Functional Statements
3.7.4.12.	**Surface Protection**
(1)	[F72-OH2.1] [F40-OH2.4]
(2)	[F72-OH2.1] [F40-OH2.4]
3.7.4.13.	**Floor Drains**
(1)	[F30-OS3.1]
	[F40-OH2.4]
3.7.4.14.	**Grab Bar Installation**
(1)	[F20-OS3.1]
3.7.4.15.	**Privacy**
(1)	[F101-OH6]
(2)	[F101-OH6]
3.7.4.16.	**Water Temperature Control**
(1)	
3.7.4.17.	**Drinking Water**
(1)	[F70-OH2.2]
3.7.4.18.	**Pharmacies**
(1)	[F40-OH2.4]
3.7.5.1.	**Electrical Systems**
(1)	[F01-OS1.1]
	[F32-OS3.3]
	[F01-OP1.1]
3.7.5.2.	**Medical Gas Piping**
(1)	[F43-OS3.4]
	[F50-OH1.1]
3.7.5.3.	**Shielding of X-Ray Equipment**
(1)	[F44-OS3.4]
3.7.6.1.	**Application**
(1)	
3.7.6.2.	**Room Finishes**
(1)	[F41-OH2.4]
(2)	
(3)	[F41-OH2.4]
3.7.6.3.	**Location of Plumbing Fixtures**
(1)	[F40-OH2.1, OH2.4]
(2)	[F72-OH2.1] [F71-OH2.3]
(3)	
3.7.6.4.	**Lavatories, Appliances and Sinks**
(1)	[F71-OH2.3]
(2)	[F40-OH2.4]
(3)	
3.7.6.5.	**Hot and Cold Water Supply**
(1)	(a) [F71-OH2.3] [F40-OH2.4]
	(b) [F70-OH2.2]
	(c) [F40-OH2.4]
(2)	
3.7.6.6.	**Employee Facilities**
(1)	[F41-OH2.4]
	[F101-OH6]
(2)	[F71-OH2.3]
3.7.6.7.	**Sleeping Quarters**
(1)	[F40-OH2.4]

Acceptable Solutions	Objectives and Functional Statements
3.8.1.1.	**Application**
(1)	
3.8.1.2.	**Entrances**
(1)	[F73-OA1]
	[F73-OA1] Applies to portion of Code text: "… the number of *barrier-free* entrances in a *building* … shall be not less than those specified."
(2)	[F73-OA1]
(3)	
(4)	
(5)	[F73-OA1]
3.8.1.3.	**Barrier-Free Path of Travel**
(1)	[F73-OA1]
(2)	(a), (b) [F30-OS3.1]
	(a), (b) [F73-OA1]
	(c) [F30-OS3.1]
	(c) [F73-OA1]
	(d), (e) [F30-OS3.1]
	(d), (e) [F73-OA1]
(3)	[F73-OA1]
(4)	[F73-OA1]
(5)	[F30-OS3.1]
3.8.1.4.	**Access to Storeys Served by Escalators and Moving Walks**
(1)	[F73-OA1]
(2)	[F73-OA1]
3.8.1.5.	**Controls**
(1)	[F10-OS3.7]
	[F73-OA1]
	[F74-OA2]
(2)	[F74-OA2]
3.8.1.6.	**Illumination**
(1)	
3.8.2.1.	**Areas Requiring Barrier-Free Path of Travel**
(1)	[F73-OA1]
(2)	
(3)	[F74-OA2]
(4)	[F73-OA1]
	[F74-OA2]
3.8.2.2.	**Access to Parking Areas**
(1)	[F73-OA1]
(2)	[F73-OA1]
(3)	(a) [F74-OA2]
	(b) [F73-OA1]
	(c) [F74-OA2]
3.8.2.3.	**Washrooms Required to be Barrier-Free**
(1)	[F72-OH2.1] [F71-OH2.3]
	[F74-OA2]
(2)	
(3)	
3.8.2.4.	**Hotels and Motels**
(1)	[F73-OA1]
	[F74-OA2]

Acceptable Solutions	Objectives and Functional Statements
(2)	
(3)	[F74-OA2]
3.8.3.1.	**Accessibility Signs**
(1)	[F73-OA1]
(2)	[F74-OA2]
(3)	[F74-OA2]
(4)	[F74-OA2]
(5)	[F73-OA1]
	[F74-OA2]
3.8.3.2.	**Exterior Walks**
(1)	[F73-OA1]
	[F30-OS3.1]
(2)	
(3)	[F73-OA1]
	[F30-OS3.1]
(4)	
3.8.3.3.	**Doorways and Doors**
(1)	[F73-OA1]
(2)	[F74-OA2]
(3)	[F10-OS3.7]
	[F74-OA2]
(4)	[F73-OA1]
(5)	[F73-OA1]
(6)	
(7)	[F73-OA1]
(8)	
(9)	[F30-OS3.1]
	[F73-OA1]
(10)	[F73-OA1]
(11)	[F30-OS3.1]
	[F73-OA1]
(12)	
(13)	[F73-OA1]
(14)	[F30-OS3.1]
(15)	[F30-OS3.1]
(16)	
(17)	[F73-OA1]
3.8.3.4.	**Ramps**
(1)	(b), (c), (d), (e) [F73-OA1]
	(b), (c), (d), (f), (g) [F30-OS3.1]
	(e)(iii) [F30-OS3.1]
	(e)(v) [F30-OS3.1]
(2)	
(3)	
3.8.3.5.	**Passenger Elevating Devices**
(1)	[F30-OS3.1] [F10-OS3.7]
3.8.3.6.	**Spaces in Seating Area**
(1)	[F30-OS3.1] Applies to portion of Code text: "... level, or level with removable seats ..."
	[F74-OA2] Applies to entire Sentence except for portion of Code text: "... without infringing on egress from any row of seating or any aisle requirements."
	(d) [F10-OS3.7]

Acceptable Solutions	Objectives and Functional Statements
3.8.3.7.	**Assistive Listening Devices**
(1)	[F11-OS3.7]
	[F74-OA2]
3.8.3.8.	**Water Closet Stalls**
(1)	[F72-OH2.1]
	[F74-OA2]
	(b) [F101-OH6]
	(b)(i) [F74-OA2]
	(d) [F30-OS3.1]
	(d)(iv) [F20-OS3.1]
	(e) [F30-OS3.1] Applies to portion of Code text: "... be equipped with a coat hook ... projecting not more than 50 mm from the wall ..."
3.8.3.9.	**Water Closets**
(1)	[F72-OH2.1]
	[F74-OA2]
3.8.3.10.	**Reserved**
3.8.3.11.	**Lavatories**
(1)	[F71-OH2.3]
	[F74-OA2]
	(d) [F31-OS3.2]
(2)	[F74-OA2]
(3)	
3.8.3.12.	**Universal Toilet Rooms**
(1)	[F72-OH2.1] [F71-OH2.3]
	[F74-OA2]
	(b) [F101-OH6] Applies to portion of Code text: "... b) ... a door capable of being locked from the inside ..."
	(b) [F10-OS3.7]
	(g) [F30-OS3.1] Applies to the requirement for a coat hook.
	(j) [F73-OA1]
(2)	
3.8.3.13.	**Showers and Bathtubs**
(1)	[F74-OA2]
	(c), (d), (f) [F30-OS3.1]
	(g) [F31-OS3.2]
(2)	
(3)	[F74-OA2]
	(c) [F30-OS3.1]
3.8.3.14.	**Reserved**
3.8.3.15.	**Shelves or Counters for Telephones**
(1)	[F74-OA2]
(2)	[F74-OA2]
(3)	[F74-OA2]
3.8.3.16.	**Drinking Fountains**
(1)	[F74-OA2]
3.9.1.1.	**Application**
(1)	
3.9.1.2.	**Heating Systems**
(1)	
3.9.2.1.	**Flame-Spread Rating**
(1)	[F02-OP1.2]
	[F02-OS1.2]

Acceptable Solutions	Objectives and Functional Statements
3.9.3.1.	**Building Areas**
(1)	[F02-OP1.1]
	[F02-OS1.1]
(2)	
3.9.3.2.	**Spatial Separations**
(1)	[F03-OP3.1]
	[F03-OS1.1]
(2)	[F03-OP3.1]
	[F03-OS1.1]
3.9.3.3.	**Fire Alarm Systems**
(1)	[F12-OS1.2, OS1.5]
(2)	
(3)	
3.9.3.4.	**Provisions for Fire Fighting**
(1)	[F12-OP1.2]
	[F12-OS1.2, OS1.5]
3.9.3.5.	**Portable Fire Extinguishers**
(1)	[F02, F12, F81-OP1.2]
	[F02, F12, F81-OS1.2]
3.9.3.6.	**Means of Egress**
(1)	
3.9.3.7.	**Fuel-Fired Appliances**
(1)	[F05-OS1.5]
	[F43-OS3.7]
(2)	[F03-OP1.2, OP1.4]
	[F03-OS1.2, OS1.4]
(3)	
(4)	
3.9.3.8.	**Washroom Facilities**
(1)	
3.9.3.9.	**Barrier-Free Access**
(1)	
3.10.1.1.	**Application**
(1)	
3.10.2.1.	**Occupancy Classification**
(1)	[F02, F03-OS1.2] [F10-OS1.5] Applies to portion of Code text: "b) shall not contain a Group F, Division 1 *occupancy*."
3.10.2.2.	**Occupant Load**
(1)	
3.10.2.3.	**Structural Fire Protection**
(1)	
(2)	[F02, F03, F04-OP1.2] [F02, F04-OP1.3]
	[F02, F03, F04-OS1.2] [F02, F04-OS1.3]
3.10.2.4.	**Safety Requirements Within Floor Areas**
(1)	
(2)	[F06-OS1.2] [F03, F05, F06-OS1.5]
	[F03, F06-OP1.2]
(3)	
(4)	
(5)	[F10, F12-OS3.7]
(6)	[F10, F12-OS3.7]

Acceptable Solutions	Objectives and Functional Statements
(7)	[F10-OS3.7]
(8)	[F30-OS3.1] [F10-OS3.7]
(9)	[F02, F03-OS1.2]
(10)	[F02, F03-OS1.2]
(11)	
(12)	
3.10.2.5.	**Exit Requirements**
(1)	
(2)	[F10-OS3.7]
(3)	
3.10.2.6.	**Service Facilities**
(1)	
(2)	[F03-OP1.2] [F03-OS1.2]
3.10.2.7.	**Sanitary Facilities**
(1)	
(2)	[F72-OH2.1] [F71-OH2.3]
3.10.3.1.	**Application**
(1)	
3.10.3.2.	**Spatial Separations**
(1)	
(2)	[F03-OP3.1] [F03-OS1.1]
3.10.3.3.	**Fire Alarm Systems**
(1)	
(2)	[F11-OS1.5]
(3)	
3.10.3.4.	**Provisions for Fire Fighting**
(1)	
(2)	[F12-OP1.2] [F12-OS1.2]
(3)	[F12-OP1.2] [F12-OS1.2]
3.10.3.5.	**Standpipe Systems**
(1)	
(2)	
3.10.4. 1.	**Application**
(1)	
3.10.4. 2.	**Building Area**
(1)	
3.10.4. 3.	**Spatial Separations**
(1)	
(2)	
(3)	[F03-OP3.1] [F03-OS1.1]
(4)	[F03-OP3.1] [F03-OS1.1]
3.10.4.4.	**Fire Alarm Systems**
(1)	
(2)	

Acceptable Solutions	Objectives and Functional Statements
3.10.4.5.	**Provisions for Fire Fighting**
(1)	
(2)	[F12-OP1.2] [F12-OS1.2]
(3)	[F12-OP1.2] [F12-OS1.2]
(4)	
(5)	[F02-OP1.2] [F02-OP3.1] [F02-OS1.2]
(6)	
(7)	
3.11.1.1.	**Application**
(1)	
(2)	
(3)	
(4)	
3.11.2.1.	**Pool Designations**
(1)	
(2)	
(3)	
3.11.3.1.	**Construction Requirements**
(1)	
(2)	
(3)	
(4)	[F30, F120-OS3.1]
(5)	[F30, F120-OS3.1]
(6)	[F30, F121-OS3.1]
(7)	[F30, F121-OS3.1]
(8)	[F30, F121-OS3.1]
(9)	(a) [F12, F30, F121-OS3.1] [F123-OS3.7] (b), (c) [F122-OH2.3]
(10)	[F30, F121-OS3.1]
(11)	(a) [F123-OS3.7] (b), (c) [F122-OH2.3] (d) [F122-OH2.3] (d) [F30-OS3.1]
(12)	[F30, F123-OS3.1]
(13)	[F40-OH2.3] [F30-OS3.1]
(14)	
(15)	[F122-OH2.3] [F30-OS3.1]
(16)	[F40, F41, F122-OH2.3]
(17)	[F40, F122-OH2.3]
(18)	[F30, F120-OS3.1]
(19)	[F40, F41, F122-OH2.3]
(20)	[F123-OS3.1]
(21)	[F123-OS3.1]
(22)	[F122-OH2.3] [F34-OS3.1]

Acceptable Solutions	Objectives and Functional Statements
(23)	[F30, F123-OS3.1]
(24)	[F30, F120, F121-OS3.1]
(25)	[F30, F120-OS3.1]
(26)	[F30, F36-OS3.1]
3.11.4.1.	**Diving Boards or Platforms**
(1)	
(2)	[F30-OS3.1]
(3)	[F30-OS3.1]
(4)	[F30-OS3.1]
(5)	
(6)	[F30, F120-OS3.1]
(7)	[F30, F120-OS3.1]
(8)	[F30, F120-OS3.1]
(9)	[F30, F120-OS3.1]
(10)	[F30-OS3.1]
(11)	[F30-OS3.1]
(12)	[F30-OS3.1]
(13)	[F30-OS3.1]
(14)	[F30-OS3.1]
(15)	[F30, F120-OS3.1]
(16)	[F30, F34-OS3.1]
(17)	[F30, F120-OS3.1]
3.11.5.1.	**Ramps into Pools**
(1)	
(2)	
(3)	[F30, F120-OS3.1]
	(d) [F40, F41-OH2.3, OH2.4]
(4)	[F30, F120-OS3.1]
(5)	[F30, F34-OS3.1]
(6)	[F30, F34-OS3.1]
(7)	[F74-OA2]
	[F30, F120, F121-OS3.1]
	(b) [F41-OH2.3]
	(d) [F34-OS3.7]
(8)	[F74-OA2]
	[F30, F120, F121-OS3.1]
	(c) [F34-OS3.7]
3.11.6.1.	**Construction Requirements**
(1)	
(2)	
(3)	[F40, F41-OH2.3, OH2.4]
(4)	[F30, F121-OS3.1]
(5)	[F30-OS3.1]
(6)	[F122-OH2.3]
(7)	[F30, F124-OS3.1]
(8)	[F30, F123-OS3.1]
(9)	[F30, F121-OS3.1]
3.11.7.1.	**Construction Requirements**
(1)	
(2)	
(3)	[F30, F121-OS3.1]

Acceptable Solutions	Objectives and Functional Statements
(4)	[F30, F121-OS3.1]
(5)	[F30, F123-OS3.1] [F40-OH2.3]
(6)	[F30, F123-OS3.1]
(7)	[F30, F120-OS3.1]
(8)	[F30, F34-OS3.1]
(9)	[F40-OH2.3]
(10)	[F30, F123-OS3.1]
(11)	[F12, F123-OS3.1]
3.11.8.1.	**Recirculation Systems**
(1)	[F40, F41-OH2.3]
(2)	
(3)	[F46-OH2.2] [F122-OH2.3]
(4)	
(5)	[F40, F41-OH2.3]
(6)	[F40, F41-OH2.3] [F124-OS3.1]
(7)	[F40, F41-OH2.3]
(8)	[F40, F41-OH2.3]
(9)	[F122-OH2.3] [F43, F122-OS3.4]
(10)	[F43, F81-OS3.4]
(11)	[F43, F81-OS3.4]
(12)	[F40, F41-OH2.3]
(13)	[F40, F41-OH2.3]
(14)	[F30, F121, F124-OS3.1]
(15)	[F30, F124-OS3.1]
(16)	[F30, F120-OS3.1]
(17)	[F30, F124-OS3.1]
(18)	[F30, F121, F124-OS3.1]
(19)	
(20)	[F30, F124-OS3.1]
3.11.9.1.	**Dressing Rooms and Sanitary Facilities**
(1)	[F72-OH2.1] [F70-OH2.2] [F71-OH2.3] [F101-OH6]
(2)	
(3)	
(4)	
(5)	[F40, F71, F122-OH2.3]
(6)	[F40, F122-OH2.3]
(7)	[F40, F71, F122-OH2.3]
(8)	[F31-OS3.2]
(9)	[F41, F45-OH2.3] [F30-OS3.1]
(10)	[F40, F41-OH2.3]
(11)	[F40, F41-OH2.3]
(12)	[F101-OH6]
(13)	[F40, F41-OH2.3] [F101-OH6]
(14)	[F40, F41-OH2.3] [F30-OS3.1]

Acceptable Solutions	Objectives and Functional Statements
3.11.10.1.	**Lighting and Emergency Provisions**
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
(3)	[F30, F123-OS3.1] [F10-OS3.7]
(4)	[F30, F123-OS3.1] [F10-OS3.7]
(5)	[F30, F123-OS3.1] [F10-OS3.7]
(6)	
(7)	[F30-OS3.1]
(8)	[F30-OS3.1]
(9)	[F30-OS3.1] [F11-OS3.7]
(10)	[F30-OS3.1] [F11, F12-OS3.7]
(11)	[F30-OS3.1] [F11, F12-OS3.7]
(12)	[F30, F124-OS3.1]
(13)	[F11, F10, F30-OS3.1]
(14)	[F11-OS3.1]
3.11.11.1.	**Service Rooms and Storage Facilities**
(1)	
(2)	[F50-OH1.1]
	[F04-OS1.3]
	[F03-OS2.1]
	[F43, F44-OS3.4] [F10-OS3.7]
(3)	[F01-OS1.1]
	[F43-OS3.4]
(4)	[F50-OH1.1]
	[F40, F41-OH2.3]
	[F43-OS3.4]
(5)	[F50-OH1.1]
	[F32, F34-OS3.3] [F34, F43-OS3.4]
3.12.1.1.	**Application**
(1)	
(2)	
(3)	
(4)	
(5)	
3.12..2.1.	**Construction Requirements**
(1)	[F40, F41, F122-OH2.3]
	[F30, F34, F120, F121, F123-OS3.1]
(2)	[F30, F121-OS3.1]
(3)	[F30, F121-OS3.1]
(4)	(a), (b) [F12, F30, F121-OS3.1] [F123-OS3.7]
	(c), (d) [F122-OH2.3]
(5)	
(6)	[F30, F121-OS3.1]
(7)	[F30, F120, F121-OS3.1]
(8)	[F70, F71, F72-OH2.3]
(9)	[F30, F36-OS3.1]
3.12.3.1.	**Ramps into Spas**
(1)	
(2)	[F74-OA2]
	[F40, F41-OH2.3, OH2.4]
	[F30, F34, F120, F121-OS3.1] [F34-OS3.7]

Acceptable Solutions	Objectives and Functional Statements
3.12.4.1.	**Water Circulation Systems**
(1)	[F46-OH2.2] [F40, F41, F122-OH2.3]
	[F30, F124-OS3.1] [F43, F81, F122-OS3.4]
(2)	[F40, F41-OH2.3]
(3)	[F40, F41, F81-OH2.3]
(4)	[F30, F124-OS3.1]
(5)	[F30, F124-OS3.1]
(6)	[F30, F124-OS3.1]
(7)	[F30, F81, F121, F124-OS3.1]
(8)	[F30, F124-OS3.1]
(9)	[F30, F124-OS3.1]
(10)	[F30, F124 - OS3.1]
(11)	[F30, F81, F124-OS3.1]
(12)	[F30, F81, F124-OS3.1]
(13)	[F30, F124-OS3.1]
(14)	[F40, F41-OH2.3]
	[F43-OS3.4]
(15)	[F40, F41, F81-OH2.3]
	[F81-OS3.1]
(16)	[F30, F124-OS3.1]
(17)	[F30, F121-OS3.1] [F31-OS3.2]
	[F31-OH1.2]
(18)	[F40, F41-OH2.3]
	[F30-OS3.1]
3.12.5.1.	**Lighting and Emergency Provisions**
(1)	[F30, F123-OS3.1] [F10-OS3.7]
(2)	[F13, F30-OS3.1]
(3)	[F30, F124-OS3.1]
(4)	[F11, F30-OS3.1]
(5)	[F30, F124-OS3.1]
3.12.6.1.	**Service Rooms and Storage Facilities**
(1)	
3.13.1.1.	**Scope**
(1)	
3.13.1.2.	**Definitions**
(1)	
3.13.2.1.	**Requirements for Stations**
(1)	
(2)	
(3)	[F02-OP1.2] Applies to portion of Code text: “... shall be of *noncombustible construction*.”
	[F02-OS1.2] Applies to portion of Code text: “... shall be of *noncombustible construction*.”
	(a), (c) [F03, F04-OP1.2] [F04-OP1.3]
	(a), (c) [F03, F04-OS1.2] [F04-OS1.3]
	(b), (c) [F04–OP1.3]
	(b), (c) [F04-OS1.3]
(4)	
(5)	[F02-OP1.2] Applies to portion of Code text: “... shall be of *noncombustible construction*.”
	[F02-OS1.2] Applies to portion of Code text: “... shall be of *noncombustible construction*.”
(6)	[F02-OP1.2] Applies to portion of Code text: “... shall be of *noncombustible construction*.”
	[F02-OS1.2] Applies to portion of Code text: “... shall be of *noncombustible construction*.”

Acceptable Solutions	Objectives and Functional Statements
(7)	
(8)	
(9)	
(10)	[F03, F04-OP1.2] [F04-OP1.3] Applies to portion of Code text: "a) ... floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 2 h," and to Clause (d).
	[F03, F04-OS1.2] [F04-OS1.3] Applies to portion of Code text: "a) ... floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 2 h," and to Clause (d).
	(b), (d) [F04-OP1.3]
	(b), (d) [F04-OS1.3]
	(c), (d) [F04-OP1.3]
	(c), (d) [F04-OS1.3]
(11)	[F03, F04-OP1.2] [F04-OP1.3] Applies to portion of Code text: "a) ... floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 1 h," and to Clause (d).
	[F03, F04-OS1.2] [F04-OS1.3] Applies to portion of Code text: "a) ... floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 1 h," and to Clause (d).
	(b), (d) [F04-OP1.3]
	(b), (d) [F04-OS1.3]
	(c), (d) [F04-OP1.3]
	(c), (d) [F04-OS1.3]
(12)	
3.13.3.1.	**Application**
(1)	
(2)	
(3)	
(4)	
(5)	
(6)	[F10-OS3.7]
3.13.3.2.	**Booths and Kiosks**
(1)	[F02-OP1.2] Applies to portion of Code text: "... shall be of *noncombustible construction*."
	[F02-OS1.2] Applies to portion of Code text: "... shall be of *noncombustible construction*."
(2)	[F02, F03-OP1.2]
	[F02, F03-OS1.2]
(3)	
3.13.3.3.	**Service Rooms and Ancillary Spaces**
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	[F10-OS1.5]
(3)	[F10-OS1.5]
(4)	[F10-OS1.5]
3.13.3.4.	**Leased Areas**
(1)	[F02, F03-OP1.2]
	[F02, F03-OS1.2]
(2)	
(3)	[F10-OS1.5]
(4)	[F02-OP1.2]
	[F02-OS1.2]
(5)	[F02-OP1.2]
	[F02-OS1.2]
(6)	
(7)	(a), (b) [F10-OS1.5]
	(c) [F10, F36-OS1.5]

Acceptable Solutions	Objectives and Functional Statements
3.13.3.5.	**Vehicle Terminal**
(1)	(a) [F02-OP1.2]
	(a) [F02-OS1.2]
	(b) [F03-OP1.2]
	(b) [F03-OS1.2]
(2)	
3.13.3.6.	**Access to Adjacent Building**
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	[F03-OS1.2] [F10-OS1.5]
(3)	[F10-OS1.5]
(4)	[F03-OP1.2]
	[F03-OS1.2] [F10-OS1.5]
(5)	[F10-OS1.5]
(6)	
3.13.3.7.	**Emergency Lighting**
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
3.13.4.1.	**Occupant Load**
(1)	
(2)	
(3)	
(4)	
(5)	
(6)	
3.13.4.2.	**General Requirements**
(1)	
(2)	[F10-OS3.7]
(3)	
(4)	[F10-OS3.7]
(5)	[F10-OS3.7]
(6)	
(7)	[F03, F06-OS1.2] [F05, F06-OS1.5]
	[F03, F06-OP1.2]
3.13.4.3.	**Number and Location of Means of Egress**
(1)	[F05, F10-OS1.2]
(2)	
(3)	[F05, F10-OS1.5]
(4)	
(5)	[F10-OS3.7]
3.13.4.4.	**Egress Capacity**
(1)	
(2)	
(3)	[F30-OS3.1] [F10-OS3.7]
(4)	[F30-OS3.1] [F10-OS3.7]
(5)	[F30-OS3.1] [F10-OS3.7]
(6)	
3.13.4.5.	**Width of Means of Egress**
(1)	
(2)	
(3)	

Acceptable Solutions	Objectives and Functional Statements
(4)	[F10-OS3.7]
(5)	
(6)	[F30-OS3.1] [F10-OS3.7]
(7)	[F30-OS3.1] [F10-OS3.7]
3.13.4.6.	**Egress Facilities**
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
(3)	[F10-OS3.7]
(4)	(a), (c) [F10-OS3.7]
	(b) [F81-OS3.7]
(5)	[F10, F81-OS3.7]
3.13.5.1.	**Fire Alarm System**
(1)	
3.13.5.2.	**Exceptions**
(1)	
(2)	
3.13.5.3.	**Fire Detectors**
(1)	[F11-OS1.5]
3.13.5.4.	**Central Supervising Station**
(1)	[F13, F81-OP1.2]
	[F13, F81-OS1.2, OS1.5]
3.13.5.5.	**Annunciators**
(1)	[F12-OS1.2, OS1.5]
3.13.5.6.	**Annunciator Indication**
(1)	[F12-OS1.2, OS1.5]
(2)	[F13, F81-OP1.2]
	[F13, F81-OS1.2, OS1.5]
(3)	[F10, F11-OS1.5]
(4)	[F10, F11-OS1.5]
3.13.5.7.	**Emergency Power**
(1)	
3.13.5.8.	**Communication Systems**
(1)	[F11, F12-OS3.7]
(2)	[F11, F12-OS3.7]
(3)	[F11, F12-OS3.7]
3.13.5.9.	**Emergency Reporting Devices**
(1)	[F30-OS3.1] [F11, F12-OS3.7]
(2)	
3.13.5.10.	**Sprinkler Systems**
(1)	
(2)	[F02-OP1.2]
	[F02-OS1.2]
(3)	[F12-OP1.2]
	[F12-OS1.2]
3.13.5.11.	**Standpipe and Hose Systems**
(1)	[F02-OP1.2]
	[F02-OS1.2]
(2)	[F12-OP1.2]
	[F12-OS1.2]
(3)	[F12-OP1.2]
	[F12-OS1.2]

Acceptable Solutions	Objectives and Functional Statements
(4)	[F02, F12-OP1.2]
	[F02, F12-OS1.2]
(5)	[F02, F12-OP1.2]
	[F02, F12-OS1.2]
(6)	
(7)	[F02-OP1.2]
	[F02-OS1.2]
(8)	[F02-OP1.2]
	[F02-OS1.2]
3.13.6.1.	**Application**
(1)	
3.13.6.2.	**Washrooms Required**
(1)	[F72-OH2.1] [F71-OH2.3]
(2)	[F101-OH6] Applies to portion of Code text: "... provided the door to the room can be locked from the inside."
(3)	
(4)	[F72-OH2.1] [F71-OH2.3]
3.13.7.1.	**Application**
(1)	[F06-OP1.2]
	[F06-OS1.2] [F05, F06-OS1.5]
3.13.8.1.	**Application**
(1)	
(2)	[F73-OA1]
3.13.8.2.	**Exception**
(1)	
3.13.8.3.	**Elevator Requirements**
(1)	[F73-OA1]
(2)	[F73-OA1]
3.13.8.4.	**Emergency Operation of Elevators**
(1)	[F12-OP1.2]
	[F12-OS1.2, OS1.5]
(2)	[F12-OP1.2]
	[F12-OS1.2, OS1.5]
(3)	[F12-OP1.2]
	[F12-OS1.2, OS1.5]
(4)	[F12-OP1.2]
	[F12-OS1.2, OS1.5]
3.13.8.5.	**Washrooms Required to be Barrier-Free**
(1)	[F73-OA1]
(2)	[F74-OA2]
(3)	[F74-OA2]
(4)	[F74-OA2]
(5)	[F74-OA2]
3.14.1.1.	**Application**
(1)	
3.14.1.2.	**General**
(1)	
(2)	
3.14.1.3.	**Means of Egress**
(1)	
(2)	
(3)	[F10, F12-OS3.7]

Acceptable Solutions	Objectives and Functional Statements
3.14.1.4.	**Clearance to Other Structures**
(1)	[F03-OP3.1]
(2)	[F03-OP3.1]
(3)	
(4)	
(5)	
3.14.1.5.	**Clearances to Flammable Material**
(1)	[F01-OP1.1] [F03-OP1.2] [F01-OS1.1] [F03-OS1.2]
3.14.1.6.	**Flame Resistance**
(1)	[F02-OS1.2]
3.14.1.7.	**Bleachers**
(1)	
3.14.1.8.	**Sanitary Facilities**
(1)	
(2)	
(3)	
3.14.1.9.	**Provision for Fire Fighting**
(1)	[F12-OP1.2] [F12-OS1.2]
3.14.2.1.	**Application**
(1)	
3.14.2.2.	**General**
(1)	[F01, F02, F36-OS1.5] Applies to portion of Code text: "*Air-supported structures shall not be used for ... Group F, Division 1 major occupancies ...*" [F10, F36-OS3.7] Applies to portion of Code text: "*Air-supported structures shall not be used for Groups B, C ... major occupancies or for classrooms.*"
(2)	[F02, F03-OS1.2]
(3)	
(4)	
(5)	
3.14.2.3.	**Spatial Separation**
(1)	[F03-OP3.1]
(2)	
(3)	[F03-OP1.2] [F03-OS1.2]
(4)	[F03-OP1.2] [F03-OS1.2]
3.14.2.4.	**Clearances to Flammable Material**
(1)	[F01-OP1.1] [F03-OP1.2] [F01-OS1.1] [F03-OS1.2]
3.14.2.5.	**Flame Resistance**
(1)	[F02-OS1.2]
(2)	
3.14.2.6.	**Emergency Air Supply**
(1)	[F20-OS3.7]
3.15.1.1.	**Application**
(1)	
3.15.1.2.	**Exceptions**
(1)	

Acceptable Solutions	Objectives and Functional Statements
3.15.2.1.	**Exceptions for Alterations**
(1)	
3.15.3.1.	**Structural Design**
(1)	
3.15.4.1.	**Combustible Sign Faces**
(1)	[F02-OP1.2]
	[F02-OS1.2]
(2)	[F02-OP1.2]
	[F02-OS1.2]
(3)	
(4)	[F02-OP1.2]
	[F02-OS1.2]
(5)	[F02-OP1.2]
	[F02-OS1.2]
3.15.5.1.	**Obstructions not Permitted**
(1)	[F50-OH1.1]
	[F102-OH7]
	[F12-OP1.2]
	[F12-OS1.2] [F10, F12-OS1.5]
	[F30-OS3.7]
3.15.5.2.	**Clearance for Exterior Signs**
(1)	[F30-OS3.1]
(2)	
(3)	
3.16.1.1.	**Application**
(1)	
(2)	
(3)	
(4)	
3.16.1.2.	**General**
(1)	[F02, F03-OS1.2] [F10-OS1.5]
	[F30-OS3.1] [F36-OS3.6]
(2)	
(3)	[F10-OS1.5]
(4)	[F10-OS1.5]
3.16.1.3.	**Construction**
(1)	
(2)	[F30-OS3.1]
(3)	
(4)	[F02, F12, F81-OP1.2]
	[F02, F12, F81-OS1.2]
3.16.1.4.	**Signs**
(1)	[F20-OP2.1]
	[F20-OS2.1]
(2)	[F01-OP1.1]
	[F01-OS1.1]
3.16.1.5.	**Lighting**
(1)	[F30-OS3.1]
(2)	[F10-OS3.7]

Acceptable Solutions	Objectives and Functional Statements
3.16.1.6.	**Sprinkler System**
(1)	[F02-OP1.2]
	[F02-OS1.2]
(2)	[F02, F81, F82-OP1.2]
	[F02, F81, F82-OS1.2]
(3)	[F02-OP1.2]
	[F02-OS1.2]
(4)	[F81-OP1.2]
	[F81-OS1.2]
(5)	[F81, F82-OP1.2]
	[F81, F82-OS1.2]
(6)	[F13-OP1.2]
	[F13-OS1.2, OS1.5]
(7)	
(8)	[F02-OP1.2]
3.16.1.7.	**Exits and Means of Egress**
(1)	[F12-OP1.2]
	[F12-OS1.2]
	[F10, F12-OS3.7]
(2)	
(3)	
(4)	[F10-OS3.7]
(5)	[F10-OS3.7]
(6)	[F10-OS3.7]
(7)	[F10-OS3.7]
(8)	[F10-OS3.7]
(9)	[F10-OS3.7]
(10)	[F10-OS3.7]
(11)	[F10-OS3.7]
(12)	[F30-OS3.1] [F10-OS3.7]
(13)	[F30-OS3.1] [F10-OS3.7]
3.16.2.1.	**Application**
(1)	
3.16.2.2.	**Construction**
(1)	(a) [F13-OP1.2]
	(a) [F13-OS1.2] [F11, F13-OS1.5]
	(b) [F13-OP1.2]
	(b) [F13-OS1.2, OS1.5]
	(c) [F02-OP1.1]
3.16.3.1.	**Application**
(1)	
3.16.3.2.	**Construction**
(1)	
(2)	[F05-OS1.5]
(3)	[F10-OS1.5]
3.17.1.1.	**Application**
(1)	
(2)	
(3)	

Acceptable Solutions	Objectives and Functional Statements
3.17.2.1.	**Change of Use and Compensating Construction**
(1)	3.2.6 Applies to additional requirements for high buildings. [F03, F06, F12, F13, F82-OP1.2] [F03-OP3.1] [F02, F03, F06, F12, F13, F82-OS1.2] [F02, F03, F05, F06, F10, F11, F12, F82-OS1.5] [F30-OS3.1] [F11, F12-OS3.7]
	3.7 Applies to health requirements for buildings. [F74-OA2] [F50-OH1.1] [F40, F72-OH2.1] [F70-OH2.2] [F71-OH2.3] [F40, F41-OH2.4] [F101-OH6] [F102-OH7] [F01-OP1.1] [F01-OS1.1] [F20, F30-OS3.1] [F32-OS3.3] [F43, F44-OS3.4]
	3.11 Applies to public pools. [F74-OA2] [F50- OH1.1] [F72-OH2.1] [F46, F70-OH2.2] [F40, F41, F45, F71 F122 - OH2.3] [F40, F41-OH2.4] [F101-OH6] [F01-OS1.1] [F04-OS1.3] [F03-OS2.1] [F12, F30, F34, F36, F120, F121, F123, F124-OS3.1] [F31- OS3.2] [F32, F34 - OS3.3] [F34, F43, F44, F81, F122-OS3.4] [F10, F11, F12, F34, F123-OS3.7]
	3.12 Applies to public spas. [F74-OA2] [F46-OH2.2] [F40, F41, F70, F71, F72, F81, F122 - OH2.3] [F40, F41-OH2.4] [F11, F12, F13, F30, F34, F36, F81, F120, F121, F123, F124-OS3.1] [F43, F81, F122-OS3.4] [F10, F34, F123-OS3.7]
(2)	
3.17.2.2.	**Performance Level and Compensating Construction**
(1)	[F140-OC]
(2)	
(3)	
(4)	

Table 4

Objectives and Functional Statements Attributed to the Acceptable Solutions in Part 4 of Division B

Acceptable Solution	Objectives and Functional Statements
4.1.1.1.	**Scope**
(1)	
4.1.1.2.	**Reserved**
4.1.1.3.	**Design Requirements**
(1)	[F20-OS2.1]
(2)	[F22-OH4]
	[F22-OP2.4]
(3)	[F20-OS2.1] Applies to structural members where temporary overloading during construction may result in impairment of that or any other member.
(4)	[F20-OS2.1, OS2.3]
	[F20-OP2.1] [F22-OP2.4]
4.1.1.4	**Design Basis**
(1)	
(2)	[F20-OS2.1] [F22-OS2.4, OS2.5]
	[F20-OP2.1] [F22-OP2.4, OP2.5]
	[F22-OH4]
(3)	[F20-OS2.1] [F22-OS2.4, OS2.5]
	[F20-OP2.1] [F22-OP2.4, OP2.5]
4.1.2.1.	**Loads and Effects**
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
	[F22-OH4]
(2)	[F20-OS2.1]
(3)	[F20-OS2.1]
4.1.2.2.	**Loads Not Listed**
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
	[F22-OH4]
4.1.3.1.	**Definitions**
(1)	
4.1.3.2.	**Strength and Stability**
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(2)	[F20-OS2.1] [F22-OS2.4, OS2.5]
	[F20-OP2.1] [F22-OP2.4, OP2.5]
(3)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(4)	[F20-OS2.1] [F22-OS2.4, OS2.5]
	[F20-OP2.1] [F22-OP2.4, OP2.5]
(5)	
(6)	
(7)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(8)	
(9)	[F20-OS2.1] [F22-OS2.4, OS2.5]
(10)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]

Acceptable Solution	Objectives and Functional Statements
4.1.3.3.	**Fatigue**
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(2)	[F20-OS2.1]
	[F20-OP2.1] [F20, F22-OP2.4]
	[F22-OH4]
4.1.3.4.	**Serviceability**
(1)	[F22-OP2.4]
	[F22-OH4]
4.1.3.5.	**Deflection**
(1)	[F22-OH4]
	[F22-OP2.4]
	(b), (c), (d) [F22-OP2.4]
(2)	[F22-OP2.4]
	[F22-OS2.3, OS2.4]
(3)	[F22-OP2.4]
(4)	
(5)	[F22-OS2.3, OS2.4]
	[F22-OP2.3, OP2.4]
4.1.3.6.	**Vibration**
(1)	[F22-OH4]
	[F22-OP2.4]
(2)	[F20-OS2.1]
	[F20-OP2.1] [F20, F22-OP2.4]
	[F22-OH4]
(3)	
4.1.4.1.	**Dead Loads**
(1)	
(2)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(3)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(4)	
(5)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(6)	[F20-OS2.1] [F22-OS2.4, OS2.5]
4.1.5.1.	**Loads Due to Use of Floors and Roofs**
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
	[F22-OH4]
(2)	
4.1.5.2.	**Uses Not Stipulated**
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
	[F22-OH4]
(2)	
4.1.5.3.	**Full and Partial Loading**
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
	[F22-OH4]

Acceptable Solution	Objectives and Functional Statements
4.1.5.4.	**Loads for Occupancy Served**
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
	[F22-OH4]
4.1.5.5.	**Loads on Exterior Areas**
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
	[F22-OH4]
(2)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
	[F22-OH4]
(3)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
	[F22-OH4]
(4)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
	[F22-OH4]
4.1.5.6.	**Loads for Dining Areas**
(1)	
4.1.5.7.	**Floor Loads Due to Intended Use**
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
	[F22-OH4]
4.1.5.8.	**More Than One Occupancy**
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
	[F22-OH4]
4.1.5.9.	**Variation with Tributary Area**
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
	[F22-OH4]
(2)	
(3)	
(4)	
4.1.5.10.	**Concentrated Loads**
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
4.1.5.11.	**Sway Forces in Assembly Occupancies**
(1)	[F20-OP2.1, OP2.4]
	[F20-OS2.1]
4.1.5.12.	**Crane-Supporting Structures and Impact of Machinery and Equipment**
(1)	[F20-OS2.1]
	[F20-OP2.1] [F20, F22-OP2.4]
(2)	[F20-OP2.1, OP2.4]
	[F20-OS2.1]
(3)	[F20-OP2.1, OP2.4]
	[F20-OS2.1]
(4)	[F20-OP2.1, OP2.4]
	[F20-OS2.1]

Acceptable Solution	Objectives and Functional Statements
4.1.5.13.	**Bleachers**
(1)	[F20-OS2.1]
	[F20-OP2.1]
(2)	
(3)	[F20-OS2.4]
4.1.5.14.	**Helicopter Landing Areas**
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
4.1.5.15.	**Loads on Guards**
(1)	[F20-OS2.1]
(2)	[F20-OS2.1, OS2.4]
(3)	
(4)	[F20-OS2.1]
(5)	
4.1.5.16.	**Loads on Vehicle Guardrails**
(1)	[F20-OS2.1]
4.1.5.17.	**Loads on Walls Acting As Guards**
(1)	[F20-OS2.1]
4.1.5.18.	**Firewalls**
(1)	[F20-OS1.2]
	[F20-OP1.2]
	[F20-OP3.1]
(2)	[F04-OS1.2]
	[F04-OP1.2]
	[F04-OP3.1]
4.1.6.1.	**Specified Load Due to Rain or to Snow and Associated Rain**
(1)	
4.1.6.2.	**Specified Snow Load**
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(2)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(3)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(4)	
(5)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(6)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(7)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(8)	(a), (b), (c), (d), (e) [F20-OP2.1] [F22-OP2.4] Applies to roof shapes and configurations that call for a higher shape factor.
	(a), (b), (c), (d), (e) [F20-OS2.1] Applies to roof shapes and configurations that call for a higher shape factor.
	[F20-OP2.1] [F22-OP2.4] Applies to portion of Code text: "The shape factor, Ca, shall be 1.0 ..."
	[F20-OS2.1] Applies to portion of Code text: "The shape factor, Ca, shall be 1.0 ..."
4.1.6.3.	**Full and Partial Loading**
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(2)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]

Acceptable Solution	Objectives and Functional Statements
4.1.6.4.	**Specified Rain Load**
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(2)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(3)	
(4)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
4.1.7.1.	**Specified Wind Load**
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
	[F22-OH4]
(2)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
	[F22-OH4]
(3)	[F20-OS2.1]
	[F20-OP2.1][F22-OP2.4]
	[F22-OH4]
(4)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
	[F22-OH4]
(5)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
	[F22-OH4]
(6)	(a), (b), (c), (d) [F20-OP2.1] [F22-OP2.4]
	(a), (b), (c), (d) [F20-OS2.1]
	(a), (b), (c), (d) [F22-OH4]
4.1.7.2.	**Dynamic Effects of Wind**
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
	[F22-OH4]
(2)	
4.1.7.3.	**Full and Partial Loading**
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
	[F22-OH4]
4.1.7.4.	**Interior Walls and Partitions**
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
4.1.8.1.	**Analysis**
(1)	
4.1.8.2.	**Notation**
(1)	
4.1.8.3.	**General Requirements**
(1)	
(2)	[F20-OS2.1]
	[F20-OP2.1, OP2.4]
(3)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(4)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]

Acceptable Solution	Objectives and Functional Statements
(5)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(6)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(7)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(8)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
4.1.8.4.	**Site Properties**
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(2)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(3)	
(4)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(5)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(6)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
4.1.8.5.	**Importance Factor**
(1)	[F20-OS2.1]
	[F20-OP2.1, OP2.3] [F22-OP2.4]
4.1.8.6.	**Structural Configuration**
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(2)	
(3)	
4.1.8.7.	**Methods of Analysis**
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
4.1.8.8.	**Direction of Loading**
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
4.1.8.9.	**SFRS Force Reduction Factors, System Overstrength Factors, and General Restrictions**
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(2)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(3)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(4)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(5)	
4.1.8.10	**Additional System Restrictions**
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(2)	(a) [F20-OP2.3] [F22-OP2.4]
	(b) [F20-OP2.3] [F22-OP2.4]
	(c) [F20-OP2.3] [F22-OP2.4]

Acceptable Solution	Objectives and Functional Statements
(3)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
4.1.8.11.	**Equivalent Static Force Procedure for Structures Satisfying the Conditions of Article 4.1.8.6.**
(1)	
(2)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(3)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(4)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(5)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(6)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(7)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(8)	(a) [F20-OP2.1] [F22-OP2.4]
	(a) [F20-OS2.1]
	(b) [F20-OP2.1] [F22-OP2.4]
	(b) [F20-OS2.1]
(9)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(10)	(a), (b) [F20-OP2.1] [F22-OP2.4]
	(a), (b) [F20-OS2.1]
4.1.8.12.	**Dynamic Analysis Procedure**
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(2)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(3)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(4)	(a) [F20-OP2.1] [F22-OP2.4]
	(a) [F20-OS2.1]
(5)	[F20-OS2.1]
	[F20-OP2.1, OP2.3] [F22-OP2.4]
(6)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(7)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(8)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(9)	
4.1.8.13.	**Deflections and Drift Limits**
(1)	[F22-OP2.3, OP2.4]
	[F22-OS2.3, OS2.4]
(2)	[F22-OP2.3, OP2.4]
	[F22-OS2.3, OS2.4]
(3)	[F22-OP2.3, OP2.4]
	[F22-OS2.3, OS2.4]
(4)	

Acceptable Solution	Objectives and Functional Statements
4.1.8.14.	**Structural Separation**
(1)	[F22-OP2.3, OP2.4]
	[F22-OP4.3]
	[F22-OS2.3, OS2.4]
(2)	[F20-OP2.1, OP2.3, OP2.4]
	[F20-OP4.3]
	[F20-OS2.1, OS2.3, OS2.4]
(3)	[F20-OP2.1, OP2.3, OP2.4]
	[F20-OP4.3]
	[F20-OS2.1, OS2.3, OS2.4]
(4)	[F20-OP2.1, OP2.3, OP2.4]
	[F20-OP4.3]
	[F20-OS2.1, OS2.3, OS2.4]
4.1.8.15.	**Design Provisions**
(1)	[F20-OP2.1, OP2.3, OP2.4]
	[F20-OS2.1]
(2)	[F20-OP2.1, OP2.4]
	[F20-OS2.1]
(3)	[F20-OP2.1, OP2.4]
	[F20-OS2.1, OS2.4]
(4)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(5)	
(6)	
4.1.8.16.	**Foundation Provisions**
(1)	[F20-OP2.1] Applies to portion of Code text: “*Foundations shall be designed to resist the lateral load capacity of the SFRS* ...”
	[F20-OS2.1] Applies to portion of Code text: “*Foundations shall be designed to resist the lateral load capacity of the SFRS* ...”
(2)	[F20-OP2.2, OP2.4]
	[F20-OS2.2, OS2.4]
(3)	(a), (b) [F22-OP2.4]
	(a), (b) [F22-OS2.4]
	(c) [F20-OP2.4]
	(c) [F20-OS2.4]
(4)	[F20-OP2.1, OP2.4]
	[F20-OS2.1]
(5)	(a) [F20-OP2.1]
	(a) [F20-OS2.1]
	(b) [F22-OP2.4]
	(b) [F22-OS2.4]
(6)	[F20-OP2.4]
	[F20-OS2.4]
(7)	[F20-OP2.2] [F22-OP2.4]
	[F20-OS2.2] [F22-OS2.4]
4.1.8.17.	**Elements of Structures, Non-structural Components and Equipment**
(1)	[F20, F22-OP2.3] [F22-OP2.4]
	[F20, F22-OS2.4]
(2)	
(3)	[F20, F22-OP2.3, OP2.4]
	[F20, F22-OS2.4]

Acceptable Solution	Objectives and Functional Statements
(4)	
(5)	[F20, F22-OP2.3, OP2.4]
	[F20, F22-OS2.4]
(6)	[F20, F22-OP2.1, OP2.4]
	[F20, F22-OS2.1]
*(7)	[F20, F22-OP2.3, OP2.4]
	[F20, F22-OS2.4]
(8)	[F20, F22-OP2.3, OP2.4] Applies to portion of Code text: "Connections to the structure of elements and components listed in Table 4.1.8.17. shall be designed to support the component or element for gravity loads, shall conform to the requirements of Sentence (1) ..."
	[F20, F22-OS2.4] Applies to portion of Code text: "Connections to the structure of elements and components listed in Table 4.1.8.17. shall be designed to support the component or element for gravity loads, shall conform to the requirements of Sentence (1) ..."
	(a), (b), (c), (d), (e) [F20, F22-OP2.3, OP2.4]
	(a), (b), (c), (d), (e) [F20, F22-OS2.4]
(9)	
(10)	[F22-OP2.3, OP2.4]
	[F22-OS2.3, OS2.4]
(11)	[F22-OP2.1, OP2.3, OP2.4]
	[F22-OS2.1, OS2.3, OS2.4]
(12)	[F20-OS2.1] [F22-OS2.4]
	[F20, F22-OP2.3, OP2.4]
(13)	[F20-OP2.1] [F22-OP2.3]
	[F20-OS2.1] [F22-OS2.3]
4.2.1.1.	**Application**
(1)	
4.2.2.1.	**Subsurface Investigation**
(1)	[F20-OS2.2] [F20, F21-OS2.6]
	[F20-OP2.2] [F21-OP2.5]
	[F21-OP4.1, OP4.4]
4.2.2.2.	**Field Review**
(1)	[F20-OP2.2] [F21-OP2.5]
	[F21-OP4.1, OP4.4]
	[F20-OS2.2] [F20, F21-OS2.6]
(2)	
4.2.2.3.	**Altered Subsurface Condition**
(1)	[F20-OP2.2] [F21-OP2.5]
	[F21-OP4.1, OP4.4]
	[F20-OS2.2] [F20, F21-OS2.6]
(2)	[F20-OP2.2] [F21-OP2.5]
	[F21-OP4.1, OP4.4]
	[F20-OS2.2] [F20, F21-OS2.6]
4.2.3.1.	**Wood**
(1)	
4.2.3.2.	**Preservation Treatment of Wood**
(1)	[F80-OS2.3]
	[F80-OP2.3]
(2)	[F82-OS2.3]
	[F82-OP2.3]
4.2.3.3.	**Plain and Reinforced Masonry**
(1)	

Acceptable Solution	Objectives and Functional Statements
4.2.3.4.	**Prevention of Deterioration of Masonry**
(1)	[F80-OS2.3] [F80-OP2.3]
4.2.3.5.	**Concrete**
(1)	
4.2.3.6.	**Protection Against Chemical Attack**
(1)	[F80-OS2.3] [F80-OP2.3]
4.2.3.7.	**Steel**
(1)	
4.2.3.8.	**Steel Piles**
(1)	[F20-OS2.3] [F20-OP2.3]
4.2.3.9.	**High Strength Steel Tendons**
(1)	[F20, F80-OS2.5, OS2.6] [F20, F80-OP2.5, OP2.6] [F20, F80-OP4.1, OP4.4]
4.2.3.10.	**Corrosion of Steel**
(1)	[F80-OS2.3] [F80-OP2.3] [F80-OP4.1]
4.2.4.1.	**Design Basis**
(1)	[F20-OS2.2] [F20, F21-OS2.6] [F20-OP2.2] [F21-OP2.5] [F21-OP4.1, OP4.4]
(2)	
(3)	
(4)	
(5)	[F21-OS2.5] [F21-OP2.4, OP2.5]
(6)	
4.2.4.2.	**Subsurface Investigation**
(1)	[F20-OS2.2] [F20, F21-OS2.6] [F20-OP2.2] [F21-OP2.6] [F21-OP4.1, OP4.4]
4.2.4.3.	**Identification**
(1)	[F20-OP2.2] [F21-OP2.6] [F21-OP4.1, OP4.4] [F20-OS2.2] [F20, F21-OS2.6]
4.2.4.4.	**Depth of Foundations**
(1)	[F21-OP2.4] Applies to portion of Code text: "... the *bearing surface* of a foundation shall be below the level of potential damage, including damage resulting from *frost action* ..." [F21-OP2.4] Applies to portion of Code text: "... the foundation shall be designed to prevent damage resulting from *adfreezing* and frost jacking."
(2)	[F21-OP2.4]
4.2.4.5.	**Sloping Ground**
(1)	[F21-OS2.2] [F21-OP2.2, OP2.4, OP2.6]
4.2.4.6.	**Eccentric and Inclined Loads**
(1)	[F20-OS2.1, OS2.2] [F20-OP2.1, OP2.2, OP2.4]

Acceptable Solution	Objectives and Functional Statements
4.2.4.7.	**Dynamic Loading**
(1)	[F20-OS2.2]
	[F20-OP2.2, OP2.4, OP2.6]
	[F20-OH4]
4.2.4.8.	**Hydrostatic Uplift**
(1)	[F22-OP2.1, OP2.4]
4.2.4.9.	**Groundwater Level Charge**
(1)	[F21-OP4.1]
4.2.4.10.	**Permafrost**
(1)	[F20-OS2.2] [F21-OS2.5]
	[F20-OP2.2] [F20, F21-OP2.4] [F21-OP2.6]
4.2.4.11.	**Swelling and Shrinking Soils**
(1)	[F21-OP2.4, OP2.6]
4.2.4.12.	**Expanding and Deteriorating Rock**
(1)	[F21-OP2.4, OP2.6]
4.2.4.13.	**Construction on Fill**
(1)	(a) [F20-OS2.2] [F21-OS2.5]
	(b) [F20-OP2.2] [F20, F21-OP2.4] [F21-OP2.6]
	(c) [F01-OS1.1]
4.2.4.14.	**Structural Design**
(1)	
4.2.5.1.	**Design of Excavations**
(1)	
4.2.5.2.	**Excavation Construction**
(1)	[F62-OP4.1]
(2)	[F20-OS2.6]
	[F20-OP2.3]
	[F20, F21-OP4.1]
4.2.5.3.	**Supported Excavations**
(1)	[F20-OS2.6]
	[F21-OP4.1]
4.2.5.4.	**Unsupported Excavations**
(1)	[F20-OS2.6]
	[F21-OP4.1]
4.2.5.5.	**Control of Water Around Excavations**
(1)	[F60-OS2.6]
	[F60-OP4.1, OP4.4]
4.2.5.6.	**Loss of Ground**
(1)	[F21-OP4.1]
4.2.5.7.	**Protection and Maintenance at Excavations**
(1)	[F80-OS2.6]
	[F80-OP4.1]
4.2.5.8.	**Backfilling**
(1)	[F21-OP4.1]
	(a) [F21-OP2.1, OP2.4]
	(a) [F21-OS2.1]
(2)	[F21-OP2.4]
4.2.6.1.	**Design of Shallow Foundations**
(1)	

Acceptable Solution	Objectives and Functional Statements
4.2.6.2.	**Support of Shallow Foundations**
(1)	[F20-OS2.2]
	[F20-OP2.2] [F20, F21-OP2.4]
4.2.6.3.	**Incorrect Placement of Shallow Foundations**
(1)	[F20-OS2.2]
	[F20-OP2.2] [F20, F21-OP2.4]
4.2.6.4.	**Damaged Shallow Foundations**
(1)	[F20-OS2.1]
	[F20-OP2.1] [F20, F22-OP2.4]
4.2.7.1.	**General**
(1)	
4.2.7.2.	**Design for Deep Foundations**
(1)	
(2)	
(3)	[F20-OS2.1, OS2.2] [F21-OS2.5]
	[F20-OP2.1, OP2.2] [F21, F22-OP2.4]
(4)	
(5)	[F20-OS2.1]
	[F20-OP2.1] [F20, F22-OP2.4]
(6)	[F20-OP2.1, OP2.4]
4.2.7.3.	**Tolerance in Alignment and Location**
(1)	[F20-OS2.1]
	[F20-OP2.1] [F20, F22-OP2.4]
4.2.7.4.	**Incorrect Alignment and Location**
(1)	[F20-OS2.1]
	[F20-OP2.1] [F20, F22-OP2.4]
4.2.7.5.	**Installation of Deep Foundations**
(1)	[F81-OS2.1] [F21-OS2.2, OS2.6]
	(a), (b) [F81-OP2.1] [F21-OP2.2] [F21, F81-OP2.4]
	(c) [F21-OP4.1]
4.2.7.6.	**Damaged Deep Foundation Units**
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
4.2.8.1.	**General**
(1)	
4.2.8.2.	**Use of Existing Foundations**
(1)	[F20-OS2.1, OS2.2]
	[F20-OP2.1, OP2.2] [F22-OP2.4]
4.3.1.1.	**Design Basis for Wood**
(1)	[F20-OS2.1] [F80-OS2.3]
	[F20-OP2.1] [F80-OP2.3] [F21, F22, F80-OP2.4]
	[F21, F22, F80-OH4]
4.3.1.2.	**Glue-Laminated Members**
(1)	[F20-OS2.1]
	[F20-OP2.1] [F21, F22-OP2.4]
	[F21, F22-OH4]
4.3.1.3.	**Termites**
(1)	

Acceptable Solution	Objectives and Functional Statements
4.3.2.1.	**Design Basis for Plain and Reinforced Masonry**
(1)	[F20-OS2.1] [F80-OS2.3]
	[F20-OP2.1] [F80-OP2.3] [F21, F22, F80-OP2.4]
	[F21, F22, F80-OH4]
4.3.3.1.	**Design Basis for Plain, Reinforced and Prestressed Concrete**
(1)	[F20-OS2.1] [F80, F81-OS2.3]
	[F20-OP2.1] [F80, F81-OP2.3] [F21, F22, F80, F81-OP2.4]
	[F21, F22, F80, F81-OH4]
4.3.4.1.	**Design Basis for Structural Steel**
(1)	[F20-OS2.1] [F80-OS2.3]
	[F20-OP2.1] [F80-OP2.3] [F20, F22, F80-OP2.4]
	[F22, F80-OH4]
4.3.4.2.	**Design Basis for Cold Formed Steel**
(1)	[F20-OS2.1] [F80-OS2.3]
	[F20-OP2.1] [F80-OP2.3] [F20, F22, F80-OP2.4]
	[F22, F80-OH4]
4.3.4.3.	**Steel Building Systems**
(1)	
4.3.5.1.	**Design Basis for Aluminium**
(1)	[F20-OS2.1] [F80-OS2.3]
	[F20-OP2.1] [F80-OP2.3] [F20, F22, F80-OP2.4]
	[F22, F80-OH4]
4.3.6.1.	**Design Basis for Glass**
(1)	[F20-OS2.1]
	[F20-OP2.1]
4.4.1.1.	**Design Basis for Air-Supported Structures**
(1)	[F20-OS2.1] [F80-OS2.3]
	[F20-OP2.1] [F80-OP2.3] [F22-OP2.4]
	[F22-OH4]
4.4.2.1.	**Design Basis for Parking Structures**
(1)	[F21, F61, F80-OS2.3]
	[F21, F61, F80-OP2.3, OP2.4]
	[F21, F61, F80-OH4]
4.4.3.1.	**Guards Over Retaining Walls**
(1)	[F30-OS3.1]
4.4.4.1.	**Anchor Systems on Building Exterior**
(1)	[F30-OS3.1]
(2)	[F20-OS2.1]
	[F30-OS3.1]
(3)	
(4)	[F81-OS2.3]
4.4.5.1.	**Manure Storage Tanks**
(1)	[F20-OP2.1] [F80-OP2.3] [F22-OP2.4]
	[F20-OS2.1] [F80-OS2.3]
	[F43-OS3.4]
	[F110-OE]
(2)	
(3)	[F43-OS3.4]
	[F110-OE]
(4)	[F80-OP2.3]
	[F80-OS2.3]

Acceptable Solution	Objectives and Functional Statements
(5)	[F20-OP2.1] [F22-OP2.4]
	[F20-OS2.1]
	[F43-OS3.4]
	[F110-OE]
(6)	[F20-OP2.2] [F20, F21-OP2.4] [F21-OP2.6]
	[F20-OS2.2] [F21-OS2.5]
	[F43-OS3.4]

Table 5
Objectives and Functional Statements Attributed to the Acceptable Solutions in Part 5 of Division B

Acceptable Solution	Objectives and Functional Statements
5.1.1.1.	**Scope**
(1)	
5.1.2.1.	**Exposure to Exterior Space or the Ground and Separation of Dissimilar Environments**
(1)	
5.1.3.1.	**Reserved**
5.1.4.1.	**Structural and Environmental Loads**
(1)	[F61-OH4]
	(a) [F20, F51, F55-OS1.4] Applies where required life safety systems are incorporated in environmental separators.
	(a) [F60, F61, F63-OS2.2, OS2.3]
	(a) [F55, F61, F63-OH1.1, OH1.2, OH1.3]
	(b) [F20-OS2.1] [F21, F22-OS2.3, OS2.4] Applies to snow fences and sloped glazing.
	(b) [F20-OS3.1] Applies to snow fences and slopped glazing.
	(b) [F20, F21, F22-OH1.1, OH1.2, OH1.3]
	(b) [F20-OH4]
(3)	[F20-OS2.1] [F21, F22-OS2.3, OS2.4]
	[F20, F21, F22-OH1.1, OH1.2, OH1.3]
(4)	(a), (b) [F20-OS2.1] [F21, F22-OS2.3, OS2.4]
	(a), (b) [F20, F21, F22-OH1.1, OH1.2, OH1.3]
(5)	[F20, F21, F22-OH1.1, OH1.2, OH1.3]
	(a) [F20-OS2.1, OS2.3]
	(b), (c) [F21, F22-OS2.3]
	(b), (c) [F22-OH4]
5.1.4.2.	**Resistance to Deterioration**
(1)	[F80, F81-OS1.4] Applies where required life safety systems are incorporated in environmental separators.
	[F80, F81-OS2.3]
	[F80, F81-OS3.1] Applies to floor assemblies.
	[F80, F81-OH1.1, OH1.2, OH1.3]
	[F80, F81-OH4] Applies to floor assemblies.
(2)	
(3)	
5.1.5.1.	**Requirements in Other Parts of the Code**
(1)	
5.2.1.1.	**Exterior Environmental Loads**
(1)	
(2)	[F20-OS2.1]
	[F20, F40-OH1.1] [F20-OH1.2, OH1.3]
(3)	
5.2.1.2.	**Interior Environmental Loads**
(1)	[F51, F55, F61, F63-OS1.4] Applies where required life safety systems are incorporated in environmental separators.
	[F55, F61, F63-OS2.3]
	[F51, F55, F61, F63-OH1.1, OH1.2]
5.2.1.3.	**Environmental Load and Transfer Calculations**
(1)	[F51, F61, F63-OS2.3] Applies to heat, air and moisture transfer calculations.
	[F51, F55, F61, F63-OH1.1, OH1.2] [F55, F61-OH1.3] Applies to heat, air and moisture transfer calculations.
	[F56-OH3.1] Applies to sound transmission calculations.
(2)	

Acceptable Solution	Objectives and Functional Statements
(3)	[F20-OS1.4] Applies where required life safety systems are incorporated in environmental separators.
	[F20-OS2.1]
	[F55, F61, F63-OH1.1, OH1.2] [F55, F61-OH1.3]
5.2.2.1.	**Determination of Structural Loads**
(1)	[F20-OS2.1] [F21, F22-OS2.3, OS2.4]
	[F20, F21, F22-OH1.1, OH1.2, OH1.3]
	[F20, F21, F22-OH4]
(2)	
(3)	[F20-OS2.1] [F21, F22-OS2.3, OS2.4]
	[F20, F21, F22-OH1.1, OH1.2, OH1.3]
	[F20, F21, F22-OH4]
5.2.2.2.	**Wind Load and Other Air Pressure Loads**
(1)	
(2)	[F20-OS2.1] [F22-OS2.3, OS2.4]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OH4]
(3)	[F20-OS2.1] [F22-OS2.3, OS2.4]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OH4]
5.2.2.3.	**Design Procedures**
(1)	[F20-OS2.1] [F22-OS2.3, OS2.4]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OH4]
5.3.1.1.	**Required Resistance to Heat Transfer**
(1)	[F51, F63-OS1.4] Applies where required life safety systems are incorporated in environmental separators.
	[F63-OS2.3]
	[F63-OH1.1] [F51, F63-OH1.2]
(2)	
5.3.1.2.	**Properties to Resist Heat Transfer**
(1)	(a), (b) [F51, F63-OH1.1]
	(b) [F51, F63-OS1.4] Applies where required life safety systems are incorporated in environmental separators.
	(b), (d) [F51, F63-OS2.3]
	(c) [F51-OH1.2]
	(d) [F30-OS3.1]
(2)	[F63-OS2.3]
	[F63-OH1.1]
(3)	
5.3.1.3.	**Location and Installation of Materials Providing Thermal Resistance**
(1)	[F63-OS2.3]
	[F51, F63-OH1.1]
(2)	[F51, F63-OS1.4] Applies where required life safety systems are incorporated in environmental separators.
	[F63-OS2.3]
	[F51, F63-OH1.1, OH1.2]
(3)	[F51, F63-OS1.4] Applies where required life safety systems are incorporated in environmental separators.
	[F63-OS2.3]
	[F41, F51, F63-OH1.1] [F51, F63-OH1.2]

Acceptable Solution	Objectives and Functional Statements
5.4.1.1.	**Required Resistance to Air Leakage**
(1)	(a), (b), (c) [F40, F55-OH1.1]
	(a), (b), (e) [F51, F52, F54, F55-OH1.2]
	(c) [F55, F61, F63-OH1.3]
	(c), (d) [F55, F61, F62, F63-OS2.3]
	(d) [F55, F62-OS3.1]
	(e) [F55, F62-OS1.4] Applies where required life safety systems are incorporated in environmental separators.
(2)	[F51, F55-OS1.4] Applies where required life safety systems are incorporated in environmental separators.
	[F61, F63-OS2.3]
	[F40, F51, F55, F61, F63-OH1.1] [F51, F52, F54, F55, F61, F63-OH1.2] [F51, F55, F61, F63-OH1.3]
(3)	
5.4.1.2.	**Air Barrier System Properties**
(1)	[F55-OS1.4] Applies where required life safety systems are incorporated in environmental separators.
	[F55-OS2.3]
	[F55-OH1.1, OH1.2, OH1.3]
(2)	
(3)	[F51, F61, F63-OS1.4] Applies where required life safety systems are incorporated in environmental separators.
	[F61, F63-OS2.3]
	[F51, F55, F61, F63-OH1.1, OH1.2] [F55, F61-OH1.3]
(4)	
5.5.1.1.	**Required Resistance to Vapour Diffusion**
(1)	[F63-OS2.3]
	[F63-OH1.1, OH1.2]
(2)	[F63-OS2.3]
	[F63-OH1.1, OH1.2]
(3)	
5.5.1.2.	**Vapour Barrier Properties and Installation**
(1)	[F63-OS2.3]
	[F63-OH1.1, OH1.2]
(2)	[F63-OS2.3]
	[F63-OH1.1, OH1.2]
(3)	[F63-OS2.3]
	[F63-OH1.1, OH1.2]
5.6.1.1.	**Required Protection from Precipitation**
(1)	[F61-OS2.3]
	[F61-OH1.1, OH1.2, OH1.3]
(2)	
5.6.1.2.	**Protective Material and Component Properties**
(1)	[F20, F61-OS2.3]
	[F61-OH1.1, OH1.2, OH1.3]
(2)	[F20, F61-OS2.3]
	[F61-OH1.1, OH1.2, OH1.3]
(3)	[F20, F61-OS2.3]
	[F61-OH1.1, OH1.2, OH1.3]
(4)	[F20, F61-OS2.3]
	[F61-OH1.1, OH1.2, OH1.3]
5.6.1.3.	**Installation of Protective Materials**
(1)	[F20-OS2.1] [F61-OS2.3]
	[F61-OH1.1, OH1.2, OH1.3]

Acceptable Solution	Objectives and Functional Statements
(2)	[F61-OS2.1, OS2.3]
	[F61-OH1.1, OH1.2, OH1.3]
(3)	[F61-OS2.3]
	[F61-OH1.1, OH1.2, OH1.3]
5.6.2.1.	**Sealing and Drainage**
(1)	[F61, F62-OS2.3]
	[F61, F62-OH1.1, OH1.2, OH1.3]
(2)	
5.6.2.2.	**Accumulation and Disposal**
(1)	[F30-OS3.1]
(2)	[F61-OS2.3]
	[F61-OH1.1, OH1.2, OH1.3]
(3)	[F21-OS2.2] [F60-OS2.3]
	[F61-OH1.1, OH1.2, OH1.3]
	(a)
	(b) [F21-OP2.6]
(4)	[F61-OS2.3]
	[F61-OH1.1, OH1.2, OH1.3]
5.7.1.1.	**Prevention of Accumulation and Ingress**
(1)	[F60-OS2.3]
	[F60-OH1.1, OH1.2, OH1.3]
(2)	[F61, F80-OS2.3]
	[F61, F80-OH1.1, OH1.2, OH1.3]
(3)	[F60-OS2.3]
	[F60-OH1.1, OH1.2, OH1.3]
5.8.1.1.	**Required Drainage**
(1)	[F60-OS2.2, OS2.3] Applies to portion of Code text: "... the bottom of every exterior *foundation* wall and every floor-on-ground shall be provided with drainage."
	[F60-OH1.1, OH1.2, OH1.3] Applies to portion of Code text: "... the bottom of every exterior *foundation* wall and every floor-on-ground shall be provided with drainage."
5.8.1.2.	**Drainage Materials and Installation**
(1)	[F21-OS2.2] [F60-OS2.3]
	[F60-OH1.1, OH1.2, OH1.3]
5.8.2.1.	**Required Moisture Protection**
(1)	[F61-OS2.3]
	[F61-OH1.1, OH1.2, OH1.3]
(2)	
5.8.2.2.	**Protective Material and Component Properties**
(1)	
(2)	[F61-OS2.3]
	[F61-OH1.1, OH1.2, OH1.3]
(3)	[F61-OS2.3]
	[F61-OH1.1, OH1.2, OH1.3]
(4)	[F61-OS2.3]
	[F61-OH1.1, OH1.2, OH1.3]
(5)	[F61-OS2.3]
	[F61-OH1.1] [F20, F61-OH1.2, OH1.3]
(6)	[F61-OS2.3]
	[F61-OH1.1, OH1.2, OH1.3]

Acceptable Solution	Objectives and Functional Statements
(7)	(a)
	(b) [F61-OS2.3]
	(b) [F61-OH1.1, OH1.2, OH1.3]
5.8.2.3.	**Installation of Moisture Protection**
(1)	[F61-OS2.3]
	[F61-OH1.1, OH1.2, OH1.3]
(2)	[F61-OS2.3]
	[F61-OH1.1, OH1.2, OH1.3]
5.9.1.1.	**Sound Transmission Class**
(1)	[F56-OH3.1]
5.9.1.2.	**Required Protection from Noise**
(1)	[F56-OH3.1]
(2)	[F56-OH3.1]
5.10.1.1.	**Compliance with Applicable Standards**
(1)	[F20-OS2.1] [F51, F61, F63, F80-OS2.3] [F51-OS2.5]
	[F61, F63, F80-OS3.1]
	[F41, F51, F54, F55, F61, F63, F80-OH1.1] [F51, F54, F55, F61, F63, F80-OH1.2] [F55, F61, F80-OH1.3]
	[F61, F63, F80-OH4] Applies to floor assemblies.
	(a) [F61, F63-OS1.4] Applies where required life safety systems are incorporated in environmental separators.
(2)	
(3)	
(4)	[F20-OS2.1] [F61, F63-OS2.3]
	[F61-OS3.1]
	[F20, F61, F63-OH1.1, OH1.2]

Table 6
Objectives and Functional Statements Attributed to the Acceptable Solutions in Part 6 of Division B

Acceptable Solution	Objectives and Functional Statements
6.1.1.1.	**Scope**
(1)	
(2)	
6.1.1.2.	**Application**
(1)	
6.2.1.1	**Good Engineering Practice**
(1)	[F31, F50, F51, F52, F54, F63-OS3.2, OS3.4]
	(a), (e), (f), (g), (h), (i) [F50, F51, F52, F54, F63-OH1.1, OH1.2, OH1.3]
	(a), (d), (e), (f), (g) [F31, F51-OP1.1]
	(b) [F63-OH1.1] [F51-OH1.2]
	(b) [F63-OS2.3]
	(c) [F40, F50, F52-OH1.1] [F51, F52-OH1.2]
	(c) [F40, F50, F53-OS3.4]
	(d) [F01-OS1.1]
	(j) [F131-OR2]
6.2.1.2.	**Design Indoor Air Temperatures**
(1)	[F51-OH1.2]
(2)	[F51-OH1.2]
6.2.1.3.	**Structural Movement**
(1)	[F23-OS3.1]
	[F50, F51, F63-OH1.1, OH1.2, OH1.3]
6.2.1.4.	**Installation Standards**
(1)	[F43-OP1.1]
	[F43-OS1.1]
	[F43-OS3.4]
(2)	[F43-OP1.1]
	[F43-OS1.1]
	[F43-OS3.4]
(3)	[F41, F50, F63-OH1.1] [F51, F52-OH1.2]
	[F63-OS2.3]
	[F44-OS3.4]
(4)	[F41, F50, F63-OH1.1] [F51, F52-OH1.2]
	[F63-OS2.3]
	[F44-OS3.4]
(5)	[F43-OP1.1]
	[F43-OS1.1]
	[F43-OS3.4]
(6)	[F51, F63-OH1.2, OH1.3]
	[F31, F51-OP1.1]
	[F31, F51, F63-OS3.2, OS3.4]
6.2.1.5.	**Fireplaces**
(1)	
6.2.1.6.	**Heat Recovery Ventilators**
(1)	
(2)	[F131-OR2]
6.2.1.7.	**Outside Design Conditions**
(1)	

Acceptable Solution	Objectives and Functional Statements
6.2.1.8.	**Installation - General**
(1)	[F82-OP1.1]
	[F82-OS1.1]
	[F82-OS3.4]
(2)	[F31-OS3.1]
(3)	[F81-OS1.1]
	[F81-OS3.2, OS3.3, OS3.4]
6.2.1.9.	**Expansion, Contraction and System Pressure**
(1)	[F20-OS3.2]
6.2.1.10.	**Asbestos**
(1)	[F43-OH1.1]
6.2.1.11.	**Access Openings**
(1)	[F36-OS3.6]
6.2.1.12.	**Combustible Tubing**
(1)	
6.2.2.1.	**Required Ventilation**
(1)	[F31, F50, F51, F52, F54, F63-OP1.1]
	[F31, F50, F51, F52, F54, F63-OS1.1]
(2)	[F50-OH1.1]
(3)	
(4)	
6.2.2.2.	**Natural Ventilation**
(1)	[F50-OH1.1]
(2)	[F50-OH1.1]
6.2.2.3.	**Ventilation of Storage and Repair Garages**
(1)	[F44, F50-OS3.4]
(2)	[F44-OS3.4]
(3)	[F44-OS3.4]
(4)	[F44, F50-OS3.4]
(5)	[F44, F50-OH1.1]
	[F44, F50-OS3.4]
(6)	
(7)	[F44, F50-OH1.1]
	[F44, F50-OS3.4]
(8)	[F44, F50-OH1.1]
	[F44, F50-OS3.4]
(9)	[F44, F50-OH1.1]
	[F44, F50-OS3.4]
(10)	
6.2.2.4.	**Air Contaminants**
(1)	[F44-OH1.1]
	[F44-OS3.4]
(2)	[F44-OH1.1]
(3)	[F52-OH1.1]
(4)	[F44-OS3.4]
6.2.2.5.	**Hazardous Gases, Dusts or Liquids**
(1)	[F01-OP1.1]
	[F01-OS1.1]
6.2.2.6.	**Commercial Cooking Equipment**
(1)	[F01, F44-OP1.1]
	[F01, F44-OS1.1]

Acceptable Solution	Objectives and Functional Statements
(2)	[F02, F81-OP1.2]
	[F02, F81-OS1.2]
6.2.2.7.	**Crawl Spaces and Attic or Roof Spaces**
(1)	[F41, F61, F63-OH1.1, OH1.3]
6.2.3.1.	**Application**
(1)	
(2)	
6.2.3.2.	**Materials in Air Duct Systems**
(1)	[F01, F02-OS1.2]
(2)	[F02-OS1.2]
(3)	[F02-OS1.2]
(4)	[F02-OS1.2]
(5)	[F20, F80-OH1.1, OH1.2, OH1.3]
(6)	[F81-OH1.1, OH1.2, OH1.3]
	[F44, F81-OS3.4]
(7)	[F20, F80-OH1.1, OH1.2, OH1.3]
6.2.3.3.	**Connections and Openings in Air Duct Systems**
(1)	[F81-OH1.1, OH1.2, OH1.3]
	[F44, F81-OS3.4]
(2)	[F82-OS1.1]
6.2.3.4.	**Duct Coverings, Linings, Adhesives and Insulation**
(1)	[F02-OS1.2]
(2)	[F02-OS1.2]
(3)	[F02-OS1.2]
(4)	[F02-OS1.2]
(5)	[F02-OS1.2]
(6)	[F01, F02-OS1.2]
(7)	[F81-OH1.1, OH1.2, OH1.3]
	[F81-OP1.1]
	[F81-OS1.1]
6.2.3.5.	**Underground Ducts**
(1)	[F44, F81-OH1.1, OH1.2, OH1.3]
(2)	[F81-OH1.1, OH1.2, OH1.3]
6.2.3.6.	**Fire Dampers**
(1)	
6.2.3.7.	**Smoke Detector Control**
(1)	
6.2.3.8.	**Exhaust Ducts and Outlets**
(1)	[F44-OH1.1]
(2)	[F44-OH1.1]
(3)	[F81-OH1.1, OH1.2]
(4)	[F81-OH1.1, OH1.2]
(5)	[F81-OH1.1]
(6)	[F81-OH1.1, OH1.2, OH1.3]
(7)	[F81-OS1.1]
(8)	[F81-OH1.1]
(9)	[F44, F81-OH1.1]
	[F44, F81-OS1.1]
(10)	[F44, F81-OH1.1]
(11)	[F44, F81-OH1.1] [F81-OH1.2]
(12)	

Acceptable Solution	Objectives and Functional Statements
(13)	
(14)	[F40, F50-OH1.1]
(15)	[F40, F50-OH1.1]
(16)	[F40, F50-OH1.1]
(17)	
6.2.3.9.	**Interconnection of Systems**
(1)	[F40-OH1.1]
	[F44-OS1.1]
(2)	[F44, F81-OH1.1]
	[F44, F81-OP1.1]
	[F44, F81-OS1.1]
(3)	[F44, F81-OH1.1]
(4)	[F40-OH1.1]
	[F44-OS1.1]
	[F10-OS3.7]
(5)	
(6)	
6.2.3.10.	**Ducts in Exits**
(1)	
6.2.3.11.	**Make-up Air**
(1)	[F50, F81-OH1.1]
	[F44, F81-OS3.4]
(2)	[F81-OH1.1]
	[F44, F81-OS3.4]
(3)	[F81-OH1.2]
6.2.3.12.	**Supply, Return, Intake and Exhaust Air**
(1)	[F81-OH1.2]
	[F30-OS3.1]
(2)	[F81-OH1.1]
	[F44, F81-OS3.4]
(3)	[F81-OH1.1]
(4)	[F81, F82-OH1.1]
	[F82-OS3.4]
(5)	[F02-OP1.2]
	[F02-OS1.2]
6.2.3.13.	**Filters and Odour Removal Equipment**
(1)	[F80-OP1.1]
	[F80-OS1.1]
(2)	[F30-OS3.3]
	[F43, F81-OH1.1]
(3)	[F82-OH1.1]
(4)	[F82-OH1.1]
6.2.3.14.	**Air Washers and Evaporative Cooling Sections or Towers**
(1)	[F80, F81-OP1.1]
	[F80, F81-OS1.1]
(2)	[F82-OH1.1]
(3)	[F01, F81-OS1.1]
6.2.3.15.	**Fans and Associated Air Handling Equipment**
(1)	[F44, F81-OH1.1]
	[F44, F81-OS3.4]
(2)	[F81-OH1.1]

Acceptable Solution	Objectives and Functional Statements
6.2.3.16.	**Vibration Isolation Connectors**
(1)	[F01, F02-OS1.2]
6.2.3.17.	**Tape**
(1)	[F02-OS1.2]
6.2.3.18.	**Construction and Installation of Ducts and Plenums**
(1)	[F20-OH4]
	[F20-OP2.4]
	[F20-OS2.3]
(2)	[F03-OP1.1]
	[F03-OS1.1]
(3)	[F63-OH1.1] [F51, F52-OH1.2]
	[F01-OS1.1]
	[F20, F63-OS2.3]
	[F20-OS3.1]
(4)	[F43, F63-OH1.1] [F51, F52-OH1.2]
	[F01-OP1.1]
	[F01-OS1.1]
	[F63-OS2.3]
(5)	[F43, F63-OH1.1] [F51, F52-OH1.2]
	[F01-OP1.1]
	[F01-OS1.1]
	[F63-OS2.3]
(6)	[F63-OH1.1] [F51, F52-OH1.2]
	[F01-OP1.1]
	[F01-OS1.1]
	[F63-OS2.3]
(7)	[F63-OH1.1] [F51, F52-OH1.2]
	[F63-OS2.3]
	[F20-OS3.1]
(8)	[F80-OH1.1, OH1.2]
	[F80-OS2.3]
(9)	[F44, F81-OH1.1] [F81-OH1.2]
6.2.3.19.	**Clearances of Ducts and Plenums**
(1)	
6.2.3.20.	**Return-Air System**
(1)	[F63-OH1.1] [F51-OH1.2]
	[F63-OS2.3]
(2)	[F01-OP1.1]
	[F01-OS1.1]
(3)	[F01-OP1.1]
	[F01-OS1.1]
(4)	[F01-OP1.1]
	[F01-OS1.1]
(5)	[F44-OH1.1]
	[F44-OS3.4]
(6)	[F40, F44-OH1.1]
	[F40, F44-OS3.4]
6.2.4.1.	**Application**
(1)	
6.2.4.2.	**Duct Design**
(1)	

Acceptable Solution	Objectives and Functional Statements
(2)	
(3)	[F20-OH1.1] [F20, F51, F52-OH1.2]
	[F20-OS2.3]
6.2.4.3.	**Construction and Installation of Ducts and Plenums**
(1)	[F20-OH4]
	[F20-OP2.4]
	[F20-OS2.3]
(2)	[F03-OP1.1]
	[F03-OS1.1]
(3)	[F63-OH1.1] [F51, F52-OH1.2]
	[F01-OS1.1]
	[F20, F63-OS2.3]
	[F20-OS3.1]
(4)	[F43, F63-OH1.1] [F51, F52-OH1.2]
	[F01-OP1.1]
	[F01-OS1.1]
	[F63-OS2.3]
(5)	[F43, F63-OH1.1] [F51, F52-OH1.2]
	[F01-OP1.1]
	[F01-OS1.1]
	[F63-OS2.3]
(6)	[F63-OH1.1] [F51, F52-OH1.2]
	[F01-OP1.1]
	[F01-OS1.1]
	[F63-OS2.3]
(7)	[F63-OH1.1] [F51, F52-OH1.2]
	[F63-OS2.3]
	[F20-OS3.1]
(8)	[F01-OP1.1]
	[F01-OS1.1]
(9)	[F80-OH1.1, OH1.2]
	[F80-OS2.3]
(10)	[F44, F81-OH1.1] [F81-OH1.2]
(11)	[F44, F81-OH1.1] [F81-OH1.2]
(12)	[F44, F81-OH1.1, OH1.2, OH1.3]
(13)	[F81-OH1.1, OH1.2, OH1.3]
6.2.4.4.	**Warm-Air Supply Outlets**
(1)	[F40, F63-OH1.1] [F51, F52-OH1.2]
	[F63-OS2.3]
(2)	[F63-OH1.1] [F51-OH1.2]
	[F63-OS2.3]
(3)	[F40, F63-OH1.1] [F51-OH1.2]
(4)	[F40, F63-OH1.1] [F51-OH1.2]
	[F63-OS2.3]
(5)	[F40, F63-OH1.1] [F51-OH1.2]
	[F63-OS2.3]
(6)	[F40, F63-OH1.1] [F51-OH1.2]
	[F63-OS2.3]
(7)	
(8)	[F31-OS3.2]

Acceptable Solution	Objectives and Functional Statements
(9)	[F40, F63-OH1.1] [F51-OH1.2]
	[F63-OS2.3] Applies to warm-air supply outlets located in finished areas
(10)	[F40-OH1.1]
	[F40-OS3.4]
6.2.4.5.	**Concrete Slabs-on-Ground**
(1)	[F51-OH1.1, OH1.2, OH1.3]
	[F51-OS2.3]
6.2.4.6.	**Adjustable Dampers and Balance Stops**
(1)	[F40, F63-OH1.1] [F51, F52-OH1.2]
	[F63-OS2.3] Applies to branch supply ducts that are not fitted with diffusers with adjustable stops
6.2.4.7.	**Return-Air System**
(1)	[F63-OH1.1] [F51-OH1.2]
	[F63-OS2.3]
(2)	[F01, F02-OP1.1]
	[F01, F02-OS1.1]
(3)	[F01-OP1.1]
	[F01-OS1.1]
(4)	[F01-OP1.1]
	[F01-OS1.1]
(5)	[F01-OP1.1]
	[F01-OS1.1]
(6)	[F51, F52-OH1.1, OH1.2]
	[F51, F52-OS2.3]
(7)	[F63-OH1.1] [F51-OH1.2]
	[F63-OS2.3]
(8)	
(9)	[F44-OH1.1]
	[F44-OS3.4]
(10)	[F40-OH1.1]
	[F44-OS1.1]
(11)	[F63-OH1.1] [F51-OH1.2]
(12)	[F01-OP1.1]
	[F01-OS1.1]
(13)	[F40, F44-OH1.1]
	[F40, F44-OS3.4]
6.2.4.8.	**Coverings, Linings and Insulation**
(1)	
(2)	[F81-OH1.1, OH1.2, OH1.3]
6.2.4.9.	**Tape**
(1)	[F02-OS1.2]
6.2.4.10.	**Clearances of Ducts and Plenums**
(1)	(a), (b) [F01-OP1.1]
	(a), (b) [F01-OS1.1]
(2)	(a), (b) [F01-OP1.1]
	(a), (b) [F01-OS1.1]
(3)	(a), (b), (c) [F01-OP1.1]
	(a), (b), (c) [F01-OS1.1]
(4)	[F01-OP1.1]
	[F01-OS1.1]
6.2.4.11.	**Exhaust Ducts and Outlets**
(1)	[F44, F81-OH1.1] [F81-OH1.2]

Acceptable Solution	Objectives and Functional Statements
(2)	[F81-OH1.1, OH1.2]
(3)	[F81-OS1.1]
(4)	[F81-OH1.1]
6.2.4.12.	**Make-up Air**
(1)	[F50, F81-OH1.1]
	[F44, F81-OS3.4]
(2)	
(3)	
6.2.4.13.	**Supply, Return, Intake and Exhaust Air Openings**
(1)	[F81-OH1.2]
	[F30-OS3.1]
(2)	[F81-OH1.1]
	[F44, F81-OS3.4]
(3)	[F81-OH1.1]
(4)	[F81, F82-OH1.1]
	[F82-OS3.4]
(5)	[F02-OP1.2]
	[F02-OS1.2]
6.2.4.14.	**Air Filters and Equipment**
(1)	[F80-OP1.1]
	[F80-OS1.1]
(2)	[F43, F81-OH1.1]
	[F30-OS3.3]
(3)	[F82-OH1.1]
6.2.5.1.	**Location of Appliances**
(1)	
6.2.5.2.	**Appliances Installed Outside the Building**
(1)	(a) [F81-OH1.1]
	(a) [F81-OP1.1]
	(a) [F81-OS1.1]
	(b) [F03-OP3.1]
	(b) [F03-OS1.2]
	(c) [F02-OP1.2]
	(c) [F02-OS1.1, OS1.2]
6.2.6.1.	**Applicable Standard**
(1)	[F81-OS1.1]
6.2.7.1.	**Clearances**
(1)	[F01-OP1.1]
	[F01-OS1.1]
6.2.8.1.	**Lining or Backing**
(1)	[F01-OP1.1]
	[F01-OS1.1]
(2)	[F01-OS1.1]
6.2.9.1.	**Piping Materials and Installation**
(1)	[F20-OS3.2, OS3.4]
(2)	[F21-OH1.1]
(3)	[F20-OS2.2]
6.2.9.2.	**Insulation and Coverings**
(1)	[F20, F30-OS3.2, OS3.4]
(2)	(a), (b) [F01-OP1.1]
	(a), (b) [F01-OS1.1]

Acceptable Solution	Objectives and Functional Statements
(3)	[F01, F02-OP1.1, OP1.2]
	[F01, F02-OS1.1, OS1.2]
(4)	[F01, F02-OP1.1]
	[F01, F02-OS1.1, OS1.2]
(5)	[F02-OS1.2]
(6)	[F31-OS3.2]
(7)	
6.2.9.3.	**Clearances**
(1)	[F01-OP1.1]
	[F01-OS1.1]
6.2.9.4.	**Surface Temperature**
(1)	[F31-OS3.2]
6.2.9.5.	**Protection**
(1)	[F01-OP1.1]
	[F01-OS1.1]
(2)	[F01-OP1.1]
	[F01-OS1.1]
6.2.9.6.	**Piping in Shafts**
(1)	
6.2.10.1.	**Cooling Units**
(1)	(a), (b), (c) [F43-OH1.1] [F51-OH1.2]
	[F43, F81-OS3.4]
6.2.11.1.	**Storage Bins**
(1)	[F30, F31, F43-OS3.2, OS3.4]
(2)	[F01-OP1.1]
	[F01-OS1.1]
(3)	[F30-OH2.1]
(4)	[F01-OP1.1]
	[F01-OS1.1]
6.2.11.2.	**Ash Storage Bins**
(1)	[F01-OP1.1]
	[F01-OS1.1]
(2)	[F01-OP1.1]
	[F01-OS1.1]
6.2.12.1.	**Application**
(1)	[F44-OS3.4]
6.2.12.2.	**Location of Carbon Monoxide Alarms**
(1)	[F44-OS3.4]
(2)	[F44-OS3.4]
(3)	
6.2.12.3.	**Installation and Conformance to Standards**
(1)	[F44-OS3.4]
6.3.1.1.	**Requirement for Venting**
(1)	
6.3.1.2.	**Masonry or Concrete Chimneys**
(1)	
(2)	[F01-OP1.1]
	[F01-OS1.1]
6.3.1.3.	**Metal Smoke Stacks**
(1)	[F01-OP1.1]
	[F01-OS1.1]

Acceptable Solution	Objectives and Functional Statements
6.3.1.4.	**Reserved**
(1)	
6.3.1.5.	**Access Ladders**
(1)	[F20, F80-OS3.1]
(2)	[F30-OS3.1]

Table 7
Objectives and Functional Statements Attributed to the Acceptable Solutions in Part 7 of Division B

Acceptable Solution	Objective and Functional Statement
7.1.1.1.	**Scope**
(1)	
7.1.2.1.	**Application**
(1)	
(2)	
7.1.3.1.	**Definitions**
(1)	
7.1.4.1.	**Facilities Required**
(1)	
7.1.4.2.	**Floor Drains**
(1)	[F62-OH1.3]
	[F62-OH2.1]
	[F62, F72-OP5]
(2)	
(3)	[F62-OH1.3]
	[F62-OH2.1] [F41-OH2.4] Applies to floor drains in garbage rooms.
	[F62, F72-OP5]
7.1.5.1.	**Sanitary Drainage Systems**
(1)	[F72-OH2.1]
(2)	[F72-OH2.1]
	[F72-OP5]
7.1.5.2.	**Storm Drainage Systems**
(1)	[F72-OP5]
7.1.5.3.	**Water Distribution Systems**
(1)	[F46, F70-OH2.2]
(2)	
(3)	
7.1.5.4.	**Separate Services**
(1)	[F70-OH2.1] [F81-OH2.2] Applies to water service pipe. [F81-OH2.6] Applies to drainage pipe.
	[F81-OP5]
(2)	[F81-OH2.2] Applies to water service pipe. [F81-OH2.6] Applies to drainage pipe.
	[F81-OP5]
7.1.5.5.	**Private Sewers and Private Water Supply**
(1)	[F62, F70-OH2.1] [F81-OH2.2] Applies to private water supply. [F81-OH2.6] Applies to private sewers.
	[F81-OP5]
7.1.6.1.	**Lighting and Ventilation Requirements**
(1)	[F30-OS3.1] Applies to the requirement for lighting.
	[F40, F41, F50-OH1.1] Applies to the requirement for ventilation.
7.1.6.2.	**Accessibility**
(1)	[F40-OH2.1] [F71-OH2.3] [F41, F81-OH2.4] [F82-OH2.1, OH2.2, OH2.3, OH2.4] Applies to the need for maintenance.
	[F81-OP5]

Acceptable Solution	Objective and Functional Statement
7.2.1.1.	**Exposure of Materials**
(1)	[F80-OH2.1, OH2.2, OH2.3, OH2.4]
	[F80-OP5]
(2)	[F80-OH2.1]
	[F80-OP5]
7.2.1.2.	**Restrictions on Re-Use**
(1)	[F41, F81-OH1.1] Applies to vent pipes. [F81-OH1.3] Applies to water pipes.
	[F81, F113-OH2.1] [F46, F70-OH2.2] [F71, F72-OH2.3] Applies to equipment.
	[F43-OS3.4] Applies to equipment.
	[F81, F113-OP5] Applies to drainage pipes. [F81-OP5] Applies to water pipes.
(2)	[F70-OH2.2]
7.2.1.3.	**Identification and Certification**
(1)	
(2)	
(3)	
(4)	
7.2.1.4.	**Pipe or Piping**
(1)	
7.2.1.5.	**Withstanding Pressure**
(1)	[F20, F81, F113-OE]
	[F20, F81, F113-OH2.1, OH2.3]
	[F20, F81, F113-OP5]
7.2.2.1.	**Surface Requirements**
(1)	[F41-OH2.4]
7.2.2.2.	**Conformance to Standards**
(1)	
(2)	[F80, F81-OH2.1, OH2.4]
	[F80, F81-OP5]
(3)	[F80, F81-OH2.1, OH2.4]
	[F80, F81-OP5]
(4)	[F80, F81-OH2.1, OH2.4]
	[F80, F81-OP5]
(5)	[F80, F81-OH2.1, OH2.4]
	[F80, F81-OP5]
(6)	[F80, F81-OH2.1, OH2.4]
	[F80, F81-OP5]
(7)	[F80, F81-OH2.1, OH2.4]
	[F80, F81-OP5]
(8)	[F80, F81-OH2.1, OH2.4]
	[F80, F81-OP5]
7.2.2.3.	**Showers**
(1)	[F80-OH2.1]
	[F80-OP5]
(2)	[F80-OH2.1, OH2.4]
	[F40-OP5]
(3)	[F45-OH2.1]
(4)	[F45-OH2.1]

Acceptable Solution	Objective and Functional Statement
7.2.2.4.	**Concealed Overflows**
(1)	[F41, F81-OH2.1, OH2.4]
7.2.2.5.	**Water Closets in Public Washrooms**
(1)	[F40-OH2.4]
7.2.2.6.	**Lavatories**
(1)	[F41, F81-OH2.1, OH2.4]
7.2.2.7.	**Trough Urinals**
(1)	[F40-OH2.1, OH2.4]
7.2.3.1.	**Traps**
(1)	[F40, F81-OH1.1]
(2)	[F44, F81-OH1.1]
(3)	[F81-OH2.1, OH2.3, OH2.4]
(4)	[F81-OH1.1]
(5)	[F81-OH1.1]
(6)	[F81-OH1.1]
(7)	
(8)	[F81-OH1.1]
	[F81-OP5]
7.2.3.2.	**Interceptors**
(1)	[F81, F82-OH2.1, OH2.3, OH2.4]
(2)	[F81-OH2.1, OH2.3, OH2.4]
7.2.3.3.	**Tubular Traps**
(1)	[F82-OH2.1, OH2.4]
	[F82-OP5]
7.2.4.1.	**T and Cross Fittings**
(1)	[F81-OH2.1, OH2.4]
	[F81-OP5]
(2)	[F81-OH2.1, OH2.4]
	[F81-OP5]
7.2.4.2.	**Sanitary T Fittings**
(1)	[F81-OH2.1, OH2.4]
	[F81-OP5]
(2)	[F81-OH2.1, OH2.4]
	[F81-OP5]
7.2.4.3.	**90° Elbows**
(1)	[F81-OH2.1, OH2.4]
	[F81-OP5]
(2)	
(3)	
7.2.4.4.	**Fittings Restricted in Use**
(1)	[F81-OH2.1, OH2.4]
	[F81-OP5]
7.2.4.5.	**Assembled Pipe or Tubing**
(1)	[F81-OH2.1, OH2.4]
	[F81-OP5]
7.2.5.1.	**Asbestos-Cement Drainage Pipe and Fittings**
(1)	[F20, F81-OH2.1, OH2.3]
	[F20, F81-OP5]
(2)	[F20, F81-OH2.1, OH2.6]
	[F20, F81-OP5]
7.2.5.2.	**Reserved.**

Acceptable Solution	Objective and Functional Statement
7.2.5.3.	**Concrete Pipe and Fittings**
(1)	[F20, F80, F81-OH2.1, OH2.6]
	[F20, F80, F81-OP5]
(2)	[F20, F80, F81-OH2.1, OH2.6]
	[F20, F80, F81-OP5]
(3)	[F20, F80, F81-OH2.1, OH2.6]
	[F20, F80, F81-OP5]
(4)	[F20, F80, F81-OH2.1, OH2.6]
	[F20, F80, F81-OP5]
(5)	[F20, F80, F81-OH2.1, OH2.6]
	[F20, F80, F81-OP5]
7.2.5.4.	**Vitrified Clay Pipe and Fittings**
(1)	[F20, F80, F81-OH2.1, OH2.6]
	[F20, F80, F81-OP5]
(2)	[F20, F80, F81-OH2.1, OH2.6]
	[F20, F80, F81-OP5]
(3)	[F20, F80, F81-OH2.1, OH2.6]
	[F20, F80, F81-OP5]
7.2.5.5.	**Polyethylene Pipe and Fittings**
(1)	[F20, F81-OH2.2]
	[F20, F81-OP5]
(2)	[F20, F81-OH2.2]
	[F20, F81-OP5]
(3)	[F20, F81-OH2.2]
	[F20, F81-OP5]
7.2.5.6.	**Polyethylene Pipe Used Underground**
(1)	[F20, F81-OH2.1, OH2.6]
	[F20, F81-OP5]
7.2.5.7.	**Crosslinked Polyethylene Pipe and Fittings**
(1)	[F20, F81-OH2.2]
	[F20, F81-OP5]
7.2.5.8.	**PVC Pipe and Fittings**
(1)	[F20, F81-OH2.2]
	[F20, F81-OP5]
(2)	[F20, F81-OH2.2]
	[F20, F81-OP5]
7.2.5.9.	**CPVC Pipe, Fittings and Solvent Cements**
(1)	[F20, F81-OH2.2]
	[F20, F81-OP5]
(2)	[F20, F81-OH2.2]
	[F20, F81-OP5]
7.2.5.10.	**Plastic Pipe, Fittings and Solvent Cement Used Underground**
(1)	[F20, F80, F81, F113-OH2.1, OH2.6]
	[F20, F80, F81, F113-OP5]
(2)	[F20, F80, F81, F113-OH2.1, OH2.6]
	[F20, F80, F81, F113-OP5]
7.2.5.11.	**Transition Solvent Cement**
(1)	[F20, F80, F81, F113-OH2.1, OH2.6]
	[F20, F80, F81, F113-OP5]
(2)	[F20, F80, F81, F113-OH2.1, OH2.6]
	[F20, F80, F81, F113-OP5]

Acceptable Solution	Objective and Functional Statement
7.2.5.12.	**Plastic Pipe, Fittings and Solvent Cement Used in Buildings**
(1)	[F20, F43, F81-OH1.1] Applies to venting system.
	[F20, F80, F81, F113-OH2.1]
	[F20, F80, F81, F113-OP5]
(2)	[F20, F80, F81-OH1.3]
	[F20, F80, F81-OP5]
(3)	[F20-OH1.3]
	[F20-OP5]
(4)	
(5)	
7.2.5.13.	**Polyethylene/Aluminum/Polyethylene Composite Pipe and Fittings**
(1)	[F20, F81-OH2.2]
	[F20, F81-OP5]
(2)	[F20, F81-OH2.2]
	[F20, F81-OP5]
7.2.5.14.	**Crosslinked Polyethylene/Aluminum/Polyethylene Composite Pipe and Fittings**
(1)	[F20, F81-OH2.2]
	[F20, F81-OP5]
7.2.5.15.	**Polypropylene Pipe and Fittings**
(1)	[F20, F81-OH2.2]
	[F20, F81-OP5]
7.2.6.1.	**Cast Iron Drainage and Vent Pipe and Fittings**
(1)	[F20, F43, F81-OH1.1] Applies to venting system.
	[F20, F80, F81, F113-OH2.1]
	[F20, F80, F81, F113-OP5]
(2)	[F20, F81-OH2.2]
	[F20, F81-OP5]
7.2.6.2.	**Cast Iron Fittings for Asbestos-Cement Drainage Pipe**
(1)	[F20, F80, F81, F113-OH2.1, OH2.6]
	[F20, F80, F81, F113-OP5]
7.2.6.3.	**Threaded Cast Iron Drainage Fittings**
(1)	[F20, F80, F81, F113-OH2.1, OH2.6]
	[F20, F80, F81, F113-OP5]
(2)	[F20, F81-OH2.2]
	[F20, F81-OP5]
7.2.6.4.	**Cast Iron Water Pipe**
(1)	[F20, F81-OH2.2]
	[F20, F81-OP5]
(2)	[F20, F81-OH2.2]
	[F20, F81-OP5]
(3)	[F20, F81-OH2.2]
	[F20, F81-OP5]
(4)	[F20, F81-OH2.2]
	[F20, F81-OP5]
7.2.6.5.	**Screwed Cast Iron Water Fittings**
(1)	[F20, F81-OH2.2]
	[F20, F81-OP5]
(2)	[F20, F81-OH2.2]
	[F20, F81-OP5]
(3)	[F81-OH2.1]

Acceptable Solution	Objective and Functional Statement
7.2.6.6.	**Screwed Malleable Iron Water Fittings**
(1)	[F20, F81-OH2.2]
	[F20, F81-OP5]
(2)	[F20, F81-OH2.2]
	[F20, F81-OP5]
(3)	[F81-OH2.1]
7.2.6.7.	**Steel Pipe**
(1)	[F43, F81-OH1.1] Applies to venting system.
	[F80, F81, F113-OH2.1] Applies to drainage system. [F46, F80, F81-OH2.2] Applies to water piping.
	[F80, F81, F113-OP5] Applies to drainage system. [F46, F80, F81-OP5] Applies to water piping.
(2)	
(3)	[F46, F80, F81-OH2.2]
	[F46, F80, F81-OP5]
(4)	[F43, F81-OH1.1] Applies to venting system.
	[F80, F81, F113-OH2.1] Applies to drainage system.
	[F80, F81, F113-OP5] Applies to drainage system.
(5)	[F80, F81, F113-OH2.1]
	[F80, F81, F113-OP5]
(6)	[F43, F81-OH1.1] Applies to venting system.
	[F80, F81, F113-OH2.1] Applies to drainage system.
	[F80, F81, F113-OP5] Applies to drainage system.
7.2.6.8.	**Corrugated Steel Pipe and Couplings**
(1)	[F20, F80, F81-OH1.3]
	[F20, F80, F81-OP5]
(2)	[F80, F81-OH1.3]
	[F80, F81-OP5]
(3)	[F80, F81-OH1.3]
	[F80, F81-OP5]
	(b) [F20-OH1.3]
	(b) [F20-OP5]
7.2.6.9.	**Sheet Metal Leaders**
(1)	[F80, F81-OH1.3]
	[F80, F81-OP5]
7.2.7.1.	**Copper and Brass Pipe**
(1)	[F43, F81-OH1.1] Applies to venting system.
	[F80, F81, F113-OH2.1] Applies to drainage system. [F46, F80, F81-OH2.2] Applies to water piping.
	[F80, F81, F113-OP5] Applies to drainage system. [F46, F80, F81-OP5] Applies to water piping.
(2)	[F43, F81-OH1.1] Applies to venting system.
	[F80, F81, F113-OH2.1] Applies to drainage system. [F46, F80, F81-OH2.2] Applies to water piping.
	[F80, F81, F113-OP5] Applies to drainage system. [F46, F80, F81-OP5] Applies to water piping.
7.2.7.2.	**Brass or Bronze Pipe Flanges and Flanged Fittings**
(1)	[F43, F81-OH1.1] Applies to venting system.
	[F80, F81, F113-OH2.1] Applies to drainage system. [F46, F80, F81-OH2.2] Applies to water piping.
	[F80, F81, F113-OP5] Applies to drainage system. [F46, F80, F81-OP5] Applies to water piping.

Acceptable Solution	Objective and Functional Statement
7.2.7.3.	**Brass or Bronze Threaded Water Fittings**
(1)	[F46, F80, F81-OH2.2]
	[F46, F80, F81-OP5]
(2)	[F80-OH2.1]
7.2.7.4.	**Copper Tube**
(1)	[F20, F43, F81-OH1.1] Applies to venting system.
	[F20, F80, F81, F113-OH2.1] Applies to drainage system. [F20, F46, F80, F81-OH2.2] Applies to water piping.
	[F20, F80, F81, F113-OP5] Applies to drainage system. [F20, F46, F80, F81-OP5] Applies to water piping.
(2)	[F20, F43, F81-OH1.1] Applies to venting system.
	[F20, F80, F81, F113-OH2.1] Applies to drainage system. [F20, F46, F80, F81-OH2.2] Applies to water piping.
	[F20, F80, F81, F113-OP5] Applies to drainage system. [F20, F46, F80, F81-OP5] Applies to water piping.
(3)	[F20, F46, F80, F81, F113-OH2.1, OH2.2]
	[F20, F46, F80, F81, F113-OP5]
(4)	[F20, F46, F80, F81, F113-OH2.1, OH2.2]
	[F20, F46, F80, F81, F113-OP5]
7.2.7.5.	**Solder-Joint Drainage Fittings**
(1)	[F20, F80, F81, F113-OH2.1]
	[F20, F80, F81, F113-OP5]
(2)	[F20, F80, F81-OH2.2]
	[F20, F80, F81-OP5]
7.2.7.6.	**Solder-Joint Water Fittings**
(1)	[F20, F46, F80, F81-OH2.2]
	[F20, F46, F80, F81-OP5]
(2)	[F20, F46, F80, F81-OH2.2]
	[F20, F46, F80, F81-OP5]
7.2.7.7.	**Flared-Joint Fittings for Copper Water Systems**
(1)	[F20, F46, F80, F81-OH2.2]
	[F20, F46, F80, F81-OP5]
(2)	[F20, F46, F80, F81-OH2.2]
	[F20, F46, F80, F81-OP5]
7.2.7.8.	**Lead Waste Pipe and Fittings**
(1)	[F20, F80, F81, F113-OH2.1] Applies to building sewer. [F20, F46, F80, F81-OH2.2] Applies to water piping.
	[F20, F80, F81, F113-OP5] Applies to drainage system. [F20, F46, F80, F81-OP5] Applies to water piping.
(2)	[F81, F113-OH2.1]
	[F81, F113-OP5]
7.2.8.1.	**Pipe and Fittings**
(1)	[F20, F43, F81-OH1.1] Applies to venting system.
	[F20, F80, F81, F113-OH2.1] Applies to drainage system.
	[F20, F80, F81, F113-OP5] Applies to drainage system.
7.2.9.1.	**Cement Mortar**
(1)	[F20, F43, F81-OH1.1] Applies to venting system.
	[F20, F80, F81, F113-OH2.1] Applies to drainage system. [F20, F46, F80, F81-OH2.2] Applies to water piping.
	[F20, F80, F81, F113-OP5] Applies to drainage system. [F20, F46, F80, F81-OP5] Applies to water piping.

Acceptable Solution	Objective and Functional Statement
7.2.9.2.	**Solder and Fluxes**
(1)	[F20, F43, F81-OH1.1] Applies to venting system.
	[F20, F80, F81, F113-OH2.1] Applies to drainage system. [F20, F46, F80, F81-OH2.2] Applies to water piping.
	[F20, F80, F81, F113-OP5] Applies to drainage system. [F20, F46, F80, F81-OP5] Applies to water piping.
(2)	[F46-OH2.2]
(3)	[F80-OH2.1, OH2.2]
(4)	[F20, F46, F80, F81-OH2.2] Applies to water piping.
	[F20, F80, F81, F113-OP5] Applies to drainage system. [F20, F46, F80, F81-OP5] Applies to water piping.
7.2.10.1.	**Brass Floor Flanges**
(1)	[F20, F80, F81, F113-OH2.1]
	[F20, F80, F81, F113-OP5]
(2)	[F20, F80, F81, F113-OH2.1]
	[F20, F80, F81, F113-OP5]
(3)	[F20, F80, F81, F113-OH2.1]
	[F20, F80, F81, F113-OP5]
(4)	[F20, F80, F81, F113-OH2.1]
	[F20, F80, F81, F113-OP5]
7.2.10.2.	**Screws, Bolts, Nuts and Washers**
(1)	[F80-OH2.1]
	[F80-OP5]
7.2.10.3.	**Cleanout Fittings**
(1)	[F80-OH2.1, OH2.3] Applies to drainage systems. [F46-OH2.2] Applies to water systems.
(2)	[F43, F81-OH1.1] Applies to venting system.
	[F81-OH2.1] Applies to drainage system.
	[F81-OP5] Applies to drainage system.
(3)	[F80-OH2.1]
7.2.10.4.	**Mechanical Couplings**
(1)	[F20, F43, F81-OH1.1] Applies to venting system.
	[F20, F80, F81, F113-OH2.1] Applies to drainage system. [F20, F46, F80, F81-OH2.2] Applies to water piping.
	[F20, F80, F81, F113-OP5] Applies to drainage system. [F20, F46, F80, F81-OP5] Applies to water piping.
(2)	[F20, F43, F81-OH1.1] Applies to venting system.
	[F20, F80, F81, F113-OH2.1] Applies to drainage system.
	[F20, F80, F81, F113-OP5] Applies to drainage system.
7.2.10.5.	**Saddle Hubs**
(1)	[F81-OH2.1]
	[F81-OP5]
(2)	
7.2.10.6.	**Supply and Waste Fittings**
(1)	[F20, F80, F81, F113-OH2.1] Applies to Waste Fittings. [F20, F46, F80, F81-OH2.2] Applies to Supply Fittings.
	[F20, F46, F80, F81-OP5] Applies to Supply Fittings. [F20, F80, F81, F113-OP5] Applies to Waste Fittings.
7.2.10.7.	**Reserved.**

Acceptable Solution	Objective and Functional Statement
7.2.10.8.	**Direct Flush Valves**
(1)	(a), (b), (c) [F130-OR1]
	(a), (b) [F80, F81-OP5]
	(c), (d) [F80-OH2.1] [F81-OH2.4]
	(d) [F46-OH2.2]
7.2.10.9.	**Drinking Fountain Bubblers**
(1)	[F40, F46-OH2.4]
(2)	[F41, F46-OH2.2]
	[F130-OR1]
7.2.10.10.	**Back-Siphonage Preventers and Backflow Preventers**
(1)	[F20, F46, F80, F81-OH2.2]
	[F20, F46, F80, F81-OP5]
(2)	[F20, F46, F80, F81-OH2.2]
	[F20, F46, F80, F81-OP5]
7.2.10.11.	**Relief Valves**
(1)	[F20, F46, F80, F81-OH2.2]
	[F20, F31, F46, F80, F81-OP5]
	[F31-OS3.2]
7.2.10.12.	**Reducing Valves**
(1)	[F20, F46, F80, F81-OH2.2]
	[F20, F46, F80, F81-OP5]
7.2.10.13.	**Solar Domestic Hot Water**
(1)	[F46-OH2.2]
	[F80, F81-OP5]
	[F81-OS3.2]
7.2.10.14.	**Vent Pipe Flashing**
(1)	[F61, F80-OH1.3]
	[F61, F80-OP2.3]
(2)	[F61, F80-OH1.3]
	[F61, F80-OP2.3]
7.2.10.15.	**Water Hammer Arresters**
(1)	[F20, F46, F80, F81-OH2.2]
	[F20, F46, F80, F81-OP5]
7.2.10.16.	**Air Admittance Valves**
(1)	[F20, F43, F81-OH1.1]
7.2.11.1.	**Design, Construction, Installation and Testing**
(1)	[F20, F46, F80, F81-OH2.2]
	[F12-OP1.4]
	[F20, F46, F80, F81-OP5]
	[F12-OS1.4]
7.2.11.2.	**Certification or Conformance**
(1)	[F20, F46, F80, F81-OH2.2]
	[F20, F46, F80, F81-OP5]
7.2.11.3.	**Tracer Wire**
(1)	[F82-OH2.2]
	[F82-OP5]
(2)	
7.2.11.4.	**Required Check Valve**
(1)	[F46-OH2.2]
(2)	[F46-OH2.2]

Acceptable Solution	Objective and Functional Statement
7.3.1.1.	**Application**
(1)	
7.3.2.1.	**Caulked Lead Drainage Joints**
(1)	[F80, F81-OH2.1] Applies to drainage system.
	[F80, F81-OP5] Applies to drainage system.
(2)	[F80-OH2.1]
(3)	[F43, F81-OH1.1] Applies to venting system.
	[F80, F81-OH2.1] Applies to drainage system.
	[F80, F81-OP5] Applies to drainage system.
(4)	[F81-OH2.1]
7.3.2.2.	**Wiped Joints**
(1)	[F43, F80, F81-OH1.1] Applies to venting system.
	[F80, F81-OH2.1] Applies to drainage system.
	[F80, F81-OP5] Applies to drainage system.
(2)	[F43, F80, F81-OH1.1] Applies to venting system.
	[F80, F81-OH2.1] Applies to drainage system.
	[F80, F81-OP5] Applies to drainage system.
(3)	[F43, F80, F81-OH1.1] Applies to venting system.
	[F80, F81-OH2.1] Applies to drainage system.
	[F80, F81-OP5] Applies to drainage system.
7.3.2.3.	**Screwed Joints**
(1)	[F81-OH2.1] Applies to drainage system. [F46, F81-OH2.2] Applies to water piping.
	[F81-OP5] Applies to drainage system.
(2)	[F46, F81-OH2.2] Applies to water piping.
7.3.2.4.	**Solder Joints**
(1)	[F43, F80, F81-OH1.1] Applies to venting system.
	[F80, F81-OH2.1] Applies to drainage system. [F20, F46, F81-OH2.2] Applies to water piping.
	[F20, F46, F81-OP5] Applies to water piping. [F20, F80, F81-OP5] Applies to drainage system.
7.3.2.5.	**Flared Joints**
(1)	[F43, F81-OH1.1] Applies to venting system.
	[F81-OH2.1] Applies to drainage system. [F20, F46, F81-OH2.2] Applies to water piping.
	[F20, F46, F81-OP5] Applies to water piping. [F20, F81-OP5] Applies to drainage system.
(2)	[F43, F81-OH1.1] Applies to venting system.
	[F81-OH2.1] Applies to drainage system. [F20, F46, F81-OH2.2] Applies to water piping.
	[F20, F46, F81-OP5] Applies to water piping. [F20, F81-OP5] Applies to drainage system.
7.3.2.6.	**Mechanical Joints**
(1)	[F43, F81-OH1.1] Applies to venting system.
	[F81-OH2.1] Applies to drainage system. [F20, F46, F81-OH2.2] Applies to water piping.
	[F20, F46, F81-OP5] Applies to water piping. [F20, F81-OP5] Applies to drainage system.

Acceptable Solution	Objective and Functional Statement
7.3.2.7.	**Cold-Caulked Joints**
(1)	[F20, F43, F81-OH1.1] Applies to bell and spigot joints in venting systems.
	[F20, F81-OH2.1] Applies to bell and spigot joints in drainage systems. [F20, F46, F81-OH2.2] Applies to water piping.
	[F20, F46, F81-OP5] Applies to water piping. [F20, F81-OP5] Applies to bell and spigot joints in drainage systems.
(2)	[F20, F43, F81-OH1.1] Applies to bell and spigot joints in venting systems.
	[F20, F81-OH2.1] Applies to bell and spigot joints in drainage systems. [F20, F46, F81-OH2.2] Applies to water piping.
	[F20, F46, F81-OP5] Applies to water piping. [F20, F81-OP5] Applies to bell and spigot joints in drainage systems.
(3)	[F20, F81-OH2.1] Applies to bell and spigot joints in drainage systems.
	[F20, F81-OP5] Applies to bell and spigot joints in drainage systems.
7.3.3.1.	**Drilled and Tapped Joints**
(1)	[F81-OH2.1] Applies to drainage piping. [F20, F46, F81-OH2.2] Applies to water piping.
	[F20, F46, F81-OP5] Applies to water piping. [F20, F81-OP5] Applies to drainage piping.
(2)	
(3)	
(4)	
(5)	[F81-OH2.1]
	[F81-OP5]
7.3.3.2.	**Reserved.**
7.3.3.3.	**Prohibition of Welding of Pipes and Fittings**
(1)	[F20-OH1.1]
	[F20-OH2.1, OH2.2]
(2)	[F80-OH2.2]
	[F80-OP5]
7.3.3.4.	**Unions and Slip Joints**
(1)	[F81-OH1.1]
	[F81-OH2.1]
(2)	[F81-OH1.1]
	[F81-OH2.1]
7.3.3.5.	**Increaser or Reducer**
	[F81-OH1.1]
	[F70, F80-OH2.2]
(1)	
7.3.3.6.	**Connection of Dissimilar Materials**
(1)	[F80-OH1.1]
	[F80-OH2.1]
	[F80-OP5]
7.3.3.7.	**Connection of Roof Drain to Leader**
(1)	[F21, F61, F81-OP5]
7.3.3.8.	**Connection of Floor Outlet Fixtures**
(1)	[F80-OH2.1]
	[F80-OP5]
(2)	[F80-OH2.1]
	[F80-OP5]
(3)	

Acceptable Solution	Objective and Functional Statement
(4)	[F20-OH2.1]
	[F20-OP5]
	[F20-OS3.1]
(5)	[F21-OH2.1]
	[F21-OP5]
7.3.3.9.	**Expansion and Contraction**
(1)	[F21-OH1.1]
	[F21-OH2.1] [F21-OH2.2]
	[F21-OP5]
7.3.3.10.	**Copper Tube**
(1)	[F20-OH1.1]
	[F20-OH2.1] [F20-OH2.2]
	[F20-OP5]
(2)	[F20-OH1.1]
	[F20-OH2.1] [F20-OH2.2]
	[F20-OP5]
7.3.3.11.	**Indirect Connections**
(1)	[F81-OH2.2, OH2.4]
(2)	[F81-OH2.2, OH2.4]
7.3.4.1.	**Capability of Support**
(1)	[F20-OH1.1]
	[F20-OH2.1, OH2.2]
	[F20-OP5]
	[F20-OS3.1]
(2)	[F20-OH2.1]
	[F20-OP5]
	[F20-OS3.1]
(3)	[F20-OH2.1]
	[F20-OP5]
	[F20-OS3.1]
7.3.4.2.	**Independence of Support**
(1)	[F20-OH2.1]
	[F20-OP5]
	[F20-OS3.1]
7.3.4.3.	**Insulation of Support**
(1)	[F80-OH1.1]
	[F80-OH2.1, OH2.2]
	[F80-OP5]
	[F80-OS3.1]
7.3.4.4.	**Support for Vertical Piping**
(1)	[F20-OH1.1] Applies to vent piping
	[F20-OH2.1] Applies to drainage piping [F20-OH2.2] Applies to water piping
	[F20-OP5]
	[F20-OS3.1]
(2)	[F20-OH1.1] Applies to vent piping
	[F20-OH2.1] Applies to drainage piping [F20-OH2.2] Applies to water piping
	[F20-OP5]
	[F20-OS3.1]

Acceptable Solution	Objective and Functional Statement
7.3.4.5.	**Support for Horizontal Piping**
(1)	[F20-OH1.1] Applies to vent piping.
	[F20, F81-OH2.1] Applies to drainage piping. [F20-OH2.2] Applies to water piping.
	[F20-OP5]
	[F20-OS3.1]
(2)	[F20-OH1.1] Applies to vent piping.
	[F20, F81-OH2.1] Applies to drainage piping. [F20-OH2.2] Applies to water piping.
	[F20-OP5]
	[F20-OS3.1]
(3)	[F20-OH1.1] Applies to vent piping.
	[F20, F81-OH2.1] Applies to drainage piping. [F20-OH2.2] Applies to water piping.
	[F20-OP5]
	[F20-OS3.1]
(4)	
(5)	[F20-OH1.1] Applies to vent piping.
	[F20, F81-OH2.1] Applies to drainage piping. [F20-OH2.2] Applies to water piping.
	[F20-OP5]
	[F20-OS3.1]
(6)	[F20-OH1.1] Applies to vent piping.
	[F20, F81-OH2.1] Applies to drainage piping. [F20-OH2.2] Applies to water piping.
	[F20-OP5]
	[F20-OS3.1]
7.3.4.6.	**Support for Underground Horizontal Piping**
(1)	[F20-OE] Applies to drainage piping.
	[F20, F81-OH2.1] Applies to drainage piping. [F20-OH2.2] Applies to water piping.
	[F20-OP5]
	[F20-OS3.1]
(2)	[F20-OE] Applies to drainage piping.
	[F20-OH1.1] Applies to vent piping.
	[F20, F81-OH2.1] Applies to drainage piping. [F20-OH2.2] Applies to water piping.
	[F20-OP5]
	[F20-OS3.1]
7.3.4.7.	**Support for Vent Pipe Above a Roof**
(1)	[F20-OH1.1]
	[F61, F81-OP2.3]
	[F81-OS3.1]
7.3.4.8.	**Compression Fittings**
(1)	[F20-OH2.1, OH2.2]
	[F20-OP5]
	[F20-OS3.1]
7.3.4.9.	**Thrust Restraint of Water Service Pipes**
(1)	[F20, F81-OH2.2]
	[F20, F81-OP5]
(2)	[F20, F81-OH2.2]
(3)	[F20, F81-OH2.2]

Acceptable Solution	Objective and Functional Statement
(4)	[F20, F81-OH2.2]
7.3.5.1.	**Backfill of Pipe Trench**
(1)	[F20-OE]
	[F81-OH2.1]
	[F81-OP5]
7.3.5.2.	**Protection of Non-Metallic Pipe**
(1)	[F20-OE]
	[F81-OH2.1]
	[F81-OP5]
7.3.5.3.	**Isolation from Loads**
(1)	[F20-OE] Applies to underground drainage piping.
	[F81-OH2.1]
	[F81-OP5]
7.3.5.4.	**Protection from Frost**
(1)	[F20-OE] Applies to underground drainage piping.
	[F81-OH2.1]
	[F81-OP5]
7.3.5.5.	**Protection from Mechanical Damage**
(1)	[F81-OH1.1] Applies to venting system.
	[F81-OH2.1] Applies to drainage system. [F81-OH2.2] Applies to water system.
	[F81-OP5]
7.3.5.6.	**Protection from Condensation**
(1)	[F63-OH2.4]
	[F63-OP2.3]
7.3.5.7.	**Spatial Separation**
(1)	[F46-OH2.2]
	[F46-OP5]
(2)	[F46-OH2.2]
	[F46-OP5]
(3)	[F46-OH2.2]
	[F46-OP5]
7.3.6.1.	**Tests and Inspection of Drainage or Venting Systems**
(1)	[F81-OH1.1] Applies to venting systems.
	[F81-OH2.1] Applies to drainage systems.
	[F81-OP5] Applies to drainage systems.
(2)	[F81-OH1.1] Applies to venting systems.
	[F81-OH2.1] Applies to drainage systems.
	[F81-OP5] Applies to drainage systems.
(3)	[F81-OH1.1] Applies to venting systems.
	[F81-OH2.1] Applies to drainage systems.
	[F81-OP5] Applies to drainage systems.
(4)	[F81-OH1.1] Applies to venting systems.
	[F81-OH2.1] Applies to drainage systems.
	[F81-OP5] Applies to drainage systems.
(5)	[F81-OH2.1] Applies to drainage systems.
7.3.6.2.	**Tests of Pipes in Drainage Systems**
(1)	[F81-OE] Applies to underground drainage piping.
	[F81-OH2.1]
	[F81-OP5] Applies to drainage systems.

Acceptable Solution	Objective and Functional Statement
7.3.6.3.	**Tests of Venting Systems**
(1)	[F81-OH1.1]
7.3.6.4.	**Water Tests in Drain, Waste and Vent Systems**
(1)	[F81-OH1.1] Applies to venting systems.
	[F81-OH2.1] Applies to drainage systems.
	[F81-OP5] Applies to drainage systems.
(2)	[F81-OH1.1] Applies to venting systems.
	[F81-OH2.1] Applies to drainage systems.
	[F81-OP5] Applies to drainage systems.
7.3.6.5.	**Air Tests**
(1)	[F81-OH1.1] Applies to venting systems.
	[F81-OH2.1] Applies to drainage systems.
	[F81-OP5] Applies to drainage systems.
7.3.6.6.	**Final Tests**
(1)	[F81-OH1.1] Applies to venting systems.
	[F81-OH2.1] Applies to drainage systems.
	[F81-OP5] Applies to drainage systems.
(2)	
7.3.6.7.	**Ball Tests**
(1)	[F81-OH2.1]
(2)	[F81-OH2.1]
7.3.7.1.	**Application of Tests**
(1)	[F81-OP5]
(2)	
(3)	[F81-OP5]
(4)	[F81-OP5]
7.3.7.2.	**Tests of Potable Water Systems**
(1)	[F20-OP5]
7.3.7.3.	**Water Tests**
(1)	[F81-OP5]
(2)	[F46-OH2.2]
7.4.1.1.	**Application of Drainage Systems**
(1)	
7.4.2.1.	**Connections to Sanitary Drainage Systems**
(1)	[F81-OH1.1]
	[F41, F43-OH2.1, OH2.4]
(2)	[F81-OH1.1]
	[F43-OH2.1, OH2.4]
(3)	[F81-OH1.1]
(4)	[F81-OH1.1]
	[F81-OH2.1]
7.4.2.2.	**Connection of Overflows from Rainwater Tanks**
(1)	[F40-OE]
7.4.2.3.	**Direct Connections**
(1)	[F81-OH2.1]
(2)	[F81-OH2.1, OH2.4]
(3)	[F81-OH2.4]
(4)	[F81-OH2.4]

Acceptable Solution	Objective and Functional Statement
7.4.3.1.	**Plumbing Fixtures**
(1)	[F41-OH1.1]
	[F40, F41-OH2.1, OH2.4]
	[F80-OP2.3]
7.4.3.2.	**Restricted Locations of Indirect Connections and Traps**
(1)	[F81-OH2.1, OH2.4]
7.4.3.3.	**Equipment Restrictions Upstream of Interceptors**
(1)	[F81-OH2.1]
(2)	
7.4.3.4.	**Fixtures Located in Chemical Storage Locations**
(1)	[F44-OE]
	[F44-OH5]
	[F01-OP1.1]
	[F81-OP2.3]
	[F01, F81-OS1.1]
	[F32-OS3.3] [F44-OS3.4]
7.4.3.5.	**Macerating Toilet**
(1)	[F72-OH2.3]
7.4.3.6.	**Drains Serving Elevator Pits**
(1)	[F43-OH1.1]
	[F43-OH2.1]
	[F62-OP2.3]
	[F62-OP5]
7.4.4.1.	**Sewage Treatment**
(1)	[F81-OE] Applies to underground drainage piping
	[F81-OH2.1]
	[F81-OP2.3]
	[F81-OP5]
	[F44-OS3.4]
7.4.4.2.	**Protection for Drainage System**
(1)	[F81-OE] Applies to underground drainage piping
	[F81-OH2.1]
	[F81-OH5]
7.4.4.3.	**Interceptors**
(1)	[F81, F112-OE]. [F111-OE] Applies to drainage systems served by a sewage system.
	[F81-OH2.1]
(2)	[F44, F81, F112-OE]. [F111-OE] Applies to drainage systems served by a sewage system.
	[F81-OH2.1]
	[F44-OH5]
	[F01-OP1.1]
	[F01-OS1.1]
(3)	
(4)	[F81-OH2.1]
	[F111-OE] Applies to drainage systems served by a sewage system.

Acceptable Solution	Objective and Functional Statement
(5)	[F44-OE] Applies to oil interceptors. [F81, F112-OE] [F111-OE] Applies to drainage systems served by a sewage system.
	[F81-OH2.1]
	[F44-OH5] Applies to oil interceptors.
	[F01-OP1.1] Applies to oil interceptors.
	[F01-OS1.1] Applies to oil interceptors.
(6)	[F44-OE] Applies to oil interceptors. [F81, F112-OE] [F111-OE] Applies to drainage systems served by a sewage system.
	[F81-OH2.1]
	[F44-OH5] Applies to oil interceptors.
	[F01-OP1.1] Applies to oil interceptors.
	[F01-OS1.1] Applies to oil interceptors.
(7)	[F81, F112-OE] [F111-OE] Applies to drainage systems served by a sewage system.
	[F81-OH2.1]
(8)	[F81, F112-OE] [F111-OE] Applies to drainage systems served by a sewage system.
	[F81-OH2.1]
(9)	[F44-OE] Applies to oil interceptors. [F81, F112-OE] [F111-OE] Applies to drainage systems served by a sewage system.
	[F81-OH2.1]
	[F44-OH5] Applies to oil interceptors.
	[F01-OP1.1] Applies to oil interceptors.
	[F01-OS1.1] Applies to oil interceptors.
(10)	
7.4.4.4.	**Neutralizing and Dilution Tanks**
(1)	[F40-OE]
	[F80-OH2.1]
	[F40-OH5]
	[F81-OP2.3]
	[F80-OP5]
	[F40, F80-OS3.4]
(2)	[F40-OE]
	[F80-OH2.1]
	[F40-OH5]
	[F81-OP2.3]
	[F80-OP5]
	[F40, F80-OS3.4]
7.4.5.1.	**Traps for Sanitary Drainage Systems**
(1)	[F81-OH1.1]
	[F42-OH2.5]
(2)	
(3)	
(4)	
(5)	[F81-OH1.1]
(6)	[F81-OH1.1]
	[F42-OH2.5]
7.4.5.2.	**Traps for Storm Drainage Systems**
(1)	[F81-OH1.1]

Acceptable Solution	Objective and Functional Statement
7.4.5.3.	**Connection of Subsoil Drainage Pipe to a Sanitary Drainage System**
(1)	[F40-OH1.1]
	[F40-OH2.1]
(2)	
(3)	[F81-OH1.1]
	[F81-OH2.1]
7.4.5.4.	**Location and Cleanout for Building Traps**
(1)	[F81-OH2.1]
7.4.5.5.	**Trap Seals**
(1)	[F81-OH1.1]
	[F42-OH2.5]
(2)	[F81-OH1.1]
	[F42-OH2.5]
7.4.6.1.	**Separate Systems**
(1)	[F40-OR1]
(2)	[F81-OH1.1]
	[F41, F81-OH2.1]
7.4.6.2.	**Location of Soil or Waste Pipes**
(1)	[F81-OH2.1, OH2.2, OH2.4]
	(a), (b) [F46-OH2.2]
7.4.6.3.	**Sumps or Tanks**
(1)	[F81-OH2.1]
(2)	[F81-OH1.1]
	[F81-OH2.1]
(3)	[F72-OH2.1]
	[F81-OH2.1]
(4)	[F81-OH2.1]
(5)	[F81-OH2.1]
(6)	[F81-OH2.1]
(7)	[F81-OH2.1]
(8)	[F81-OH2.1]
7.4.6.4.	**Protection from Backflow**
(1)	[F81-OH1.1]
	[F81-OH2.1]
(2)	[F81-OH1.1]
	[F81-OH2.1]
(3)	[F81-OH2.1]
(4)	
(5)	[F40-OH1.1]
	[F40-OH2.1]
7.4.6.5.	**Mobile Home Sewer Service**
(1)	[F81-OH2.1]
7.4.6.6.	**Building Drain Ends**
(1)	
7.4.7.1.	**Cleanouts for Drainage Systems**
(1)	[F81-OH2.1]
(2)	[F81-OH2.1]
(3)	[F81-OH2.1]
(4)	[F81-OH2.1]
(5)	[F81-OH2.1]
(6)	[F81-OH2.1]

Acceptable Solution	Objective and Functional Statement
(7)	[F81-OH2.1]
(8)	[F81-OH2.1]
(9)	[F81-OH2.1]
(10)	[F81-OH2.1]
7.4.7.2.	**Size and Spacing of Cleanouts**
(1)	[F81-OH2.1]
(2)	[F81-OH2.1]
(3)	[F81-OH2.1]
(4)	[F81-OH2.1]
(5)	[F81-OH2.1]
(6)	[F81-OH2.1]
7.4.7.3.	**Manholes**
(1)	[F20-OS3.1]
(2)	(a), (c) [F81-OH1.1]
	(a), (c) [F81-OS1.1]
	(b), [F20, F30, F80-OS3.1]
(3)	[F30-OS3.1] [F36-OS3.6]
(4)	[F81-OH2.1]
7.4.7.4.	**Location of Cleanouts**
(1)	[F81-OH2.1]
(2)	[F81-OH1.1]
	[F30-OS3.1]
(3)	
(4)	[F81-OH2.1]
(5)	[F81-OH2.1]
(6)	[F43-OH2.1]
	[F43-OH5]
7.4.8.1.	**Minimum Slope**
(1)	[F81-OH2.1]
(2)	
(3)	[F81-OH2.1]
7.4.8.2.	**Length of Fixture Outlet Pipes**
(1)	[F81-OH1.1]
7.4.9.1.	**No Reduction in Size**
(1)	[F81-OH2.1]
(2)	[F81-OH2.1]
(3)	
7.4.9.2.	**Serving Water Closets**
(1)	[F81-OH2.1]
(2)	[F81-OH2.1]
(3)	[F81-OH2.1]
(4)	[F81-OH2.1]
7.4.9.3.	**Size of Fixture Outlet Pipes**
(1)	[F81-OH2.1]
(2)	[F81-OH2.1]
(3)	[F81-OH1.1]
	[F81-OP5]
7.4.9.4.	**Minimum Size of Building Drains and Sewers**
(1)	[F81-OH2.1]
(2)	[F81-OH2.1]

Acceptable Solution	Objective and Functional Statement
7.4.10.1.	**Total Load on a Pipe**
(1)	
7.4.10.2.	**Hydraulic Loads for Fixtures**
(1)	
(2)	
7.4.10.3.	**Hydraulic Loads from Fixtures with Continuous or Semi-continuous Flow**
(1)	
(2)	
(3)	
7.4.10.4.	**Hydraulic Loads from Roofs or Paved Surfaces**
(1)	
(2)	[F20, F81-OP5]
	(a), (d), (e) [F41, F81-OH2.4, OH2.5]
	(b), (c) [F20, F81-OS2.1]
7.4.10.5.	**Conversion of Fixture Units to Litres and Gal/min**
(1)	
(2)	
7.4.10.6.	**Hydraulic Loads to Soil or Waste Pipes**
(1)	[F81-OH2.1]
(2)	[F81-OH2.1]
(3)	[F81-OH2.1]
(4)	[F81-OH2.1]
7.4.10.7.	**Hydraulic Loads on Branches**
(1)	[F81-OH2.1]
7.4.10.8.	**Hydraulic Loads on Sanitary Horizontal Drain**
(1)	[F81-OH2.1]
(2)	[F81-OH2.1]
7.4.10.9.	**Hydraulic Loads on Horizontal Storm Drains**
(1)	[F81-OH2.1]
7.4.10.10.	**Rain Leaders**
(1)	
(2)	[F62, F81-OH1.3]
(3)	[F62, F81-OH1.3]
7.5.1.1.	**Venting for Traps**
(1)	[F81-OH1.1]
(2)	[F81-OH1.1]
(3)	
(4)	
7.5.2.1.	**Wet Venting**
(1)	[F40, F81-OH1.1]
7.5.3.1.	**Circuit Venting**
(1)	[F40, F81-OH1.1]
(2)	[F40, F81-OH1.1]
(3)	[F40, F81-OH1.1]
(4)	[F40, F81-OH1.1]
(5)	[F40, F81-OH1.1]
(6)	[F40, F81-OH1.1]
(7)	[F40, F81-OH1.1]
(8)	[F40, F81-OH1.1]
(9)	[F40, F81-OH1.1]
(10)	[F40, F81-OH1.1]

Acceptable Solution	Objective and Functional Statement
(11)	
7.5.4.1.	**Stack Vents**
(1)	[F40, F81-OH1.1]
7.5.4.2.	**Vent Stacks**
(1)	[F40, F81-OH1.1]
(2)	
(3)	[F40, F81-OH1.1]
(4)	[F40, F81-OH1.1]
7.5.4.3.	**Yoke Vents**
(1)	[F40, F81-OH1.1]
(2)	[F40, F81-OH1.1]
(3)	[F40, F81-OH1.1]
(4)	
7.5.4.4.	**Offset Relief Vents**
(1)	[F40, F81-OH1.1]
7.5.4.5.	**Fixtures Draining into Vent Pipes**
(1)	[F40, F81-OH1.1]
7.5.5.1.	**Venting of Sanitary Sewage Sumps**
(1)	[F40, F81-OH1.1]
7.5.5.2.	**Venting of Interceptors**
(1)	[F40, F81-OH1.1]
	[F81-OH2.1]
	[F01, F40, F81-OP1.1]
	[F01, F40, F81-OS1.1]
(2)	[F40, F81-OH1.1]
	[F81-OH2.1]
	[F01, F40, F81-OP1.1]
	[F01, F40, F81-OS1.1]
(3)	[F40, F81-OH1.1]
	[F01, F40, F81-OP1.1]
	[F01, F40, F81-OS1.1]
(4)	[F40, F81-OH1.1]
	[F01, F40, F81-OP1.1]
	[F01, F40, F81-OS1.1]
(5)	[F40, F81-OH1.1]
	[F01, F40, F81-OP1.1]
	[F01, F40, F81-OS1.1]
(6)	[F40, F81-OH1.1]
	[F81-OH2.1]
(7)	[F40, F81-OH1.1]
	[F81-OH2.1]
(8)	[F40, F81-OH1.1]
	[F81-OH2.1]
	[F01, F40, F81-OP1.1]
	[F01, F40, F81-OS1.1]
7.5.5.3.	**Venting of Corrosive Drain Piping and Dilution Tanks**
(1)	[F81-OS3.4]
7.5.5.4.	**Fresh Air Inlets**
(1)	[F81-OH1.1]

Acceptable Solution	Objective and Functional Statement
7.5.5.5.	**Provision for Future Installations**
(1)	[F81-OH1.1] Applies to venting systems.
	[F81-OH2.1] Applies to drainage systems.
(2)	[F40, F81-OH1.1]
7.5.6.1.	**Drainage of Vent Pipes**
(1)	[F81-OH1.1]
(2)	[F81-OH1.1]
7.5.6.2.	**Vent Pipe Connections**
(1)	[F81-OH1.1]
(2)	[F81-OH1.1]
(3)	[F40, F81-OH1.1]
7.5.6.3.	**Location of Vent**
(1)	[F81-OH1.1]
(2)	[F81-OH2.1]
(3)	[F81-OH1.1]
(4)	[F40, F81-OH1.1]
(5)	
7.5.6.4.	**Connection of Vents above Fixtures Served**
(1)	[F81-OH1.1]
(2)	[F81-OH1.1]
7.5.6.5.	**Terminals**
(1)	[F81-OH1.1]
(2)	[F81-OH1.1]
(3)	
(4)	[F81-OH1.1]
(5)	[F81-OH1.1]
(6)	[F81-OH1.1]
(7)	[F20, F81-OH1.1]
(8)	[F61, F80-OH1.3]
	[F61, F80-OP2.3]
(9)	[F61-OH1.3]
	[F61-OP2.3]
(10)	[F81-OH1.1]
7.5.7.1.	**General**
(1)	[F81-OH1.1]
7.5.7.2.	**Size Restriction**
(1)	[F81-OH1.1]
(2)	[F81-OH1.1]
(3)	[F81-OH1.1]
7.5.7.3.	**Additional Circuit Vents and Relief Vents**
(1)	
(2)	[F81-OH1.1]
7.5.7.4.	**Offset Relief Vents**
(1)	[F81-OH1.1]
7.5.7.5.	**Yoke Vents**
(1)	[F81-OH2.1]
7.5.7.6.	**Vent Pipes for Manholes**
(1)	[F81-OH2.1]
7.5.7.7.	**Vents for Sanitary Sewage Sumps or Tanks, Dilution Tanks and Macerating Toilet Systems**
(1)	[F81-OH2.1]
(2)	[F81-OH2.1]

Acceptable Solution	Objective and Functional Statement
(3)	[F81-OH1.1]
7.5.8.1.	**Hydraulic Loads Draining to Wet Vents**
(1)	[F81-OH1.1]
(2)	[F81-OH1.1]
7.5.8.2.	**Individual Vents and Dual Vents**
(1)	[F81-OH1.1]
(2)	
7.5.8.3.	**Branch Vents, Headers, Continuous Vents and Circuit Vents**
(1)	[F81-OH1.1]
(2)	
(3)	
(4)	
(5)	
7.5.8.4.	**Vent Stacks or Stack Vents**
(1)	[F81-OH1.1]
(2)	
(3)	[F81-OH1.1]
(4)	[F81-OH1.1]
(5)	[F81-OH1.1]
7.5.8.5.	**Lengths for other Vent Pipes**
(1)	
7.5.9.1.	**Air Admittance Valve as a Vent Terminal**
(1)	
7.5.9.2.	**Air Admittance Valves**
(1)	[F40, F81-OH1.1]
	(a) [F140-OC]
(2)	[F40, F81-OH1.1]
(3)	[F40, F81-OH1.1]
7.5.9.3.	**Installation Conditions**
(1)	[F40, F81-OH1.1]
(2)	[F40, F81-OH1.1]
(3)	[F40, F81-OH1.1]
(4)	[F40, F81-OH1.1]
(5)	[F40, F81-OH1.1]
7.6.1.1.	**Design, Fabrication and Installation**
(1)	[F70-OH2.2]
(2)	[F31-OS3.2]
(3)	[F31-OS3.2]
(4)	[F71-OH2.3]
7.6.1.2.	**Drainage**
(1)	[F81-OP5]
7.6.1.3.	**Control and Shut-off Valves**
(1)	[F81-OP5]
(2)	[F81-OP5]
(3)	[F81-OP5]
(4)	[F81-OP5]
(5)	[F81-OP5]
(6)	[F81-OP5]
7.6.1.4.	**Shut-off Valves**
(1)	[F81-OP5]
7.6.1.5.	**Water Closets**

Acceptable Solution	Objective and Functional Statement
(1)	[F81-OP5]
7.6.1.6.	**Suites**
(1)	[F70-OH2.2]
	[F81-OP5]
7.6.1.7.	**Public Washrooms**
(1)	[F81-OP5]
7.6.1.8.	**Tanks**
(1)	[F81-OP5]
7.6.1.9.	**Protection for Exterior Water Supply**
(1)	[F81-OP5]
7.6.1.10.	**Check Valves**
(1)	[F20, F81-OP5]
7.6.1.11.	**Flushing Devices**
(1)	[F72-OH2.1]
(2)	[F72-OH2.1]
7.6.1.12.	**Relief Valves**
(1)	[F20, F81-OP1.1]
	[F20, F81-OS1.1]
	[F20, F81-OS2.3]
	[F31, F81-OS3.2] Applies to pressure vessels containing hot water
(2)	[F20, F81-OP1.1]
	[F20, F81-OS1.1]
	[F20, F81-OS2.3]
	[F31, F81-OS3.2]
(3)	
(4)	[F20, F81-OP1.1] [F20, F81-OS1.1] [F20, F81-OS2.3] (b) [F31, F81-OS3.2]
(5)	[F20, F81-OP1.1]
	[F20, F81-OS1.1]
	[F20, F81-OS2.3]
	[F31, F81-OS3.2]
	(b) [F81-OH2.2] Applies to the size of air break
(6)	[F20, F81-OP1.1]
	[F20, F81-OS1.1]
	[F20, F81-OS2.3]
	[F31, F81-OS3.2]
(7)	[F20, F81-OP1.1]
	[F20, F81-OS1.1]
	[F20, F81-OS2.3]
	[F31, F81-OS3.2]
7.6.1.13.	**Solar Domestic Hot Water Systems**
(1)	[F70-OH2.2]
	[F20-OS2.2, OS2.3]
	[F31-OS3.2] [F81-OS3.4]
(2)	[F61-OH1.3]
	[F70-OH2.2]
	[F20-OS2.2, OS2.3]
	[F31-OS3.2] [F81-OS3.4]

Acceptable Solution	Objective and Functional Statement
7.6.1.14.	**Water Hammer**
(1)	[F20-OH4]
	[F20, F81-OP5]
	[F20, F81-OS3.2]
7.6.1.15.	**Mobile Home Water Service**
(1)	[F46, F70-OH2.2]
7.6.1.16.	**Thermal Expansion**
(1)	[F20, F46, F81-OP5]
7.6.2.1.	**Connection of Systems**
(1)	[F81-OH2.1] [F46, F70, F81-OH2.2]
(2)	[F46, F70, F81-OH2.2]
7.6.2.2.	**Back Siphonage**
(1)	[F81-OH2.1] [F46, F70, F81-OH2.2]
(2)	[F81-OH2.1] [F46, F70, F81-OH2.2]
(3)	[F81-OH2.1] [F46, F70, F81-OH2.2]
7.6.2.3.	**Reserved.**
7.6.2.4.	**BackFlow from Fire Protection Systems.**
(1)	
(2)	[F81-OH2.1] [F46, F70, F81-OH2.2]
(3)	[F02, F12, F81-OP1.2]
	[F02, F12, F81-OS1.2]
(4)	[F81-OH2.1] [F46, F70, F81-OH2.2]
(5)	[F81-OH2.1] [F46, F70, F81-OH2.2]
(6)	
(7)	
(8)	
(9)	[F81-OH2.1] [F46, F70, F81-OH2.2]
7.6.2.5.	**Reserved.**
7.6.2.6.	**Reserved.**
7.6.2.7.	**Reserved.**
7.6.2.8.	**Cleaning of Systems**
(1)	[F81-OH2.1] [F46, F70, F81-OH2.2]
7.6.2.9.	**Air Gap**
(1)	[F81-OH2.1] [F46, F70, F81-OH2.2]
(2)	[F81-OH2.1] [F46, F70, F81-OH2.2]
7.6.2.10.	**Vacuum Breakers and Flood Levels**
(1)	
(2)	[F81-OH2.1] [F46, F70, F81-OH2.2]
(3)	[F81-OH2.1] [F46, F70, F81-OH2.2]
(4)	[F81-OH2.1] [F46, F70, F81-OH2.2]
7.6.3.1.	**Design**
(1)	[F70, F81-OH2.2]
(2)	
(3)	
(4)	[F70, F81-OH2.2]
(5)	[F70, F81-OH2.2] [F40-OH2.1, OH2.4]
7.6.3.2.	**Hydraulic Load**
(1)	[F70, F81-OH2.2]
(2)	[F70, F81-OH2.2]
(3)	[F70, F81-OH2.2]

Acceptable Solution	Objective and Functional Statement
7.6.3.3.	**Static Pressure**
(1)	[F20, F81-OP1.1]
	[F20, F81-OP5]
	[F20, F81-OS1.1]
	[F20, F81-OS2.3]
	[F31, F81-OS3.2] Applies to pipes containing hot water
7.6.3.4.	**Size**
(1)	[F70, F81-OH2.2]
7.6.4.1.	**Water Supply Fittings**
(1)	[F130-OR1]
(2)	
7.6.4.2.	**Plumbing Fixtures**
(1)	[F130-OR1]
(2)	[F130-OR1]
(3)	[F130-OR1]
(4)	
7.6.5.1.	**Maximum Temperature of Hot Water**
(1)	[F31-OS3.2]
(2)	[F31-OS3.2]
7.6.5.2.	**Showers**
(1)	[F31-OH1.2]
	[F30-OS3.1] [F31-OS3.2]
(2)	
(3)	
(4)	[F31-OH1.2]
	[F31-OS3.2]
7.6.5.3.	**Temperature Control Devices**
(1)	[F31-OH1.2]
	[F31-OS3.2]
7.7.1.1.	**Non-Potable Connection**
(1)	[F46-OH2.2]
7.7.2.1.	**Markings Required**
(1)	[F46, F81-OH2.2]
7.7.3.1.	**Pipes**
(1)	[F81-OH2.1, OH2.2, OH2.4]
	(c), (d) [F46-OH2.2]
7.7.3.2.	**Outlets**
(1)	[F46-OH2.2] [F40-OH2.4]

Table 8
Objectives and Functional Statements Attributed to the Acceptable Solutions in Part 8 of Division B

Acceptable Solution	Objective and Functional Statement
8.1.1.1.	**Scope**
(1)	
8.1.1.2.	**Definitions**
(1)	
8.1.2.1.	**Classification of Systems**
(1)	
8.1.2.2.	**Operation and Maintenance**
(1)	
8.1.3.1.	**Discharge**
(1)	[F81, F110, F111-OE]
	[F81, F110, F111-OH5]
(2)	
(3)	
(4)	
(5)	
(6)	
(7)	[F81, F110, F111-OE]
	[F81, F110, F111-OH5]
(8)	[F81, F111-OE]
	[F81, F111-OH5]
8.2.1.1.	**Scope**
(1)	
8.2.1.2.	**Site Evaluation**
(1)	[F110, F111, F112-OE]
	[F110, F111, F112-OH5]
(2)	
(3)	
8.2.1.3.	**Sewage System Design Flows**
(1)	
(2)	
(3)	
(4)	
8.2.1.4.	**Clearances**
(1)	
(2)	[F110, F112-OE]
	[F110, F112-OH5]
(3)	[F110, F112-OE]
	[F110, F112-OH2.1]
	[F110, F112-OH5]
(4)	[F110, F111, F112-OE]
	[F110, F111, F112-OH5]
8.2.1.5.	**Clearance Distances for Class 1, 2 and 3 Sewage Systems**
(1)	[F110, F112-OE]
	[F110, F112-OH5]
8.2.1.6.	**Clearances for a Class 4 or 5 Sewage System**
(1)	[F110, F112-OE]
	[F110, F112-OH2.1]
	[F110, F112-OH5]

Acceptable Solution	Objective and Functional Statement
(2)	[F110, F112-OE]
	[F110, F112-OH2.1]
	[F110, F112-OH5]
(3)	[F110-OE]
	[F110-OH2.1]
	[F110-OH5]
8.2.2.1.	**Application**
(1)	
8.2.2.2.	**Tanks**
(1)	[F110, F111, F112-OE]
	[F110, F111, F112-OH5]
	[F20-OP2.3]
(2)	[F110, F111, F112-OE]
	[F110, F111, F112-OH5]
	[F20-OP2.3]
(3)	
(4)	
(5)	[F82, F111-OE]
	[F82, F111-OH2.1]
	[F82, F111-OH5]
(6)	[F20-OP2.3]
(7)	[F81-OP2.6]
8.2.2.3.	**Septic Tanks**
(1)	[F111-OE]
	[F111-OH2.1]
	[F111-OH5]
(2)	[F111, F112-OE]
	[F111, F112-OH2.1]
	[F111, F112-OH5]
(3)	[F111, F112-OE]
	[F111, F112-OH2.1]
	[F111, F112-OH5]
(4)	[F111, F112-OE]
	[F111, F112-OH2.1]
	[F111, F112-OH5]
	(e) [F110-OE]
	(e) [F110-OH5]
(5)	[F111, F112-OE]
	[F111, F112-OH2.1]
	[F111, F112-OH5]
(6)	[F111, F112-OE]
	[F111, F112-OH2.1]
	[F111, F112-OH5]
(7)	[F111, F112-OE]
	[F111, F112-OH2.1]
	[F111, F112-OH5]
(8)	[F111, F112-OE]
	[F111, F112-OH2.1]
	[F111, F112-OH5]

Acceptable Solution	Objective and Functional Statement
(9)	[F82, F111-OE]
	[F82, F111-OH2.1]
	[F82, F111-OH5]
(10)	[F82, F111-OE]
	[F82, F111-OH2.1]
	[F82, F111-OH5]
(11)	[F82, F111-OE]
	[F82, F111-OH2.1]
	[F82, F111-OH5]
8.2.2.4.	**Holding Tanks**
(1)	[F82, F111-OE]
	[F82, F111-OH2.1]
	[F82, F111-OH5]
(2)	[F111-OE]
	[F111-OH2.1]
	[F111-OH5]
(3)	
(4)	
8.3.1.1.	**Scope**
(1)	
8.3.1.2.	**Application**
(1)	[F111, F112-OE]
	[F111, F112-OH2.1]
	[F111, F112-OH5]
(2)	
(3)	[F110-OE]
	[F110-OH5]
8.3.2.1.	**Construction Requirements**
(1)	(a), (b) [F42-OH2.5]
	(c), (d), (h) [F40-OH2.4]
	(e) [F101-OH6]
	(f), (g) [F50-OH1.1]
	(f), (g) [F42-OH2.5]
8.3.3.1.	**Construction Requirements**
(1)	(a) [F110, F112-OE]
	(a) [F110, F112-OH5]
	(b) [F20-OS2.2]
	(b), (d) [F113-OH2.6]
	(c) [F112-OE]
	(c) [F112-OH5]
	(d) [F110-OE]
8.3.4.1.	**Construction Requirements**
(1)	(a) [F40-OH2.4] [F113-OH2.6]
	(b) [F113-OH2.6]
	(c) [F111-OE]
	(c) [F111-OH5]
8.3.5.1.	**Construction Requirements**
(1)	(a) [F113-OH2.6]
	(b) [F40-OH2.4]
	(c) [F20-OS2.1]

Acceptable Solution	Objective and Functional Statement
8.4.1.1.	**Scope**
(1)	
8.4.1.2.	**Application**
(1)	[F110-OE]
	[F110-OH5]
(2)	
8.4.2.1.	**Construction Requirements**
(1)	[F110, F112-OE]
	[F110, F112-OH5]
(2)	[F113-OH2.6]
	[F20-OS2.2]
(3)	[F112-OE]
	[F112-OH5]
(4)	[F82-OE]
	[F42-OH2.5] [F113-OH2.6]
	[F82-OH5]
	[F30-OS3.1]
(5)	[F113-OH2.6]
(6)	[F111-OE]
	[F111-OH5]
(7)	[F112-OE]
	[F112-OH5]
8.4.2.2.	**Maximum Sewage Flow**
(1)	[F110, F112-OE]
	[F110, F112-OH5]
8.4.2.3.	**Sizing**
(1)	[F110, F112-OE]
	[F110, F112-OH5]
8.5.1.1.	**Scope**
(1)	
8.5.1.2.	**Application**
(1)	[F110, F112-OE]
	[F110, F112-OH5]
(2)	[F112-OE]
	[F112-OH5]
8.5.2.1.	**Construction Requirements**
(1)	[F110, F112-OE]
	[F110, F112-OH5]
(2)	[F113-OH2.6]
	[F20-OS2.2]
(3)	[F112-OE]
	[F112-OH5]
(4)	[F82-OE]
	[F42-OH2.5] [F113-OH2.6]
	[F82-OH5]
	[F30-OS3.1]
(5)	[F30-OS3.1]
(6)	[F113-OH2.6]
(7)	[F111-OE]
	[F111-OH5]

Acceptable Solution	Objective and Functional Statement
(8)	[F112-OE]
	[F112-OH5]
8.6.1.1.	**Scope**
(1)	
8.6.1.2.	**General Requirements**
(1)	[F112-OE]
	[F112-OH5]
8.6.1.3.	**Pumps and Siphons**
(1)	[F110, F111, F112-OE]
	[F110, F111, F112-OH2.1]
	[F110, F111, F112-OH5]
(2)	[F110, F111, F112-OE]
	[F110, F111, F112-OH5]
(3)	[F111, F113-OE]
	[F111, F113-OH5]
(4)	[F112-OE]
	[F112-OH5]
8.6.2.1.	**Septic Tank Systems**
(1)	[F110, F111-OE]
	[F110, F111-OH5]
(2)	[F110, F111-OE]
	[F110, F111-OH5]
(3)	[F82-OE]
	[F82-OH2.1]
8.6.2.2.	**Other Treatment Units**
(1)	[F110-OE]
	[F110-OH5]
(2)	[F110, F111-OE]
	[F110, F111-OH5]
(3)	[F111-OE]
	[F111-OH2.1]
	[F111-OH5]
(4)	[F111-OE]
	[F111-OH2.1]
	[F111-OH5]
(5)	
(6)	[F82, F111-OE]
	[F82, F111-OH2.1]
	[F82, F111-OH5]
8.7.1.1.	**Application**
(1)	[F110, F111-OE]
	[F110, F111-OH2.1]
	[F110, F111-OH5]
8.7.2.1.	**General Requirements**
(1)	[F110, F111-OE]
	[F110, F111-OH2.1]
	[F110, F111-OH5]
(2)	[F104, F110, F111-OE]
	[F104, F110, F111-OH2.1]
	[F104, F110, F111-OH5]
	[F104, F110, F111-OR2]

Acceptable Solution	Objective and Functional Statement
(3)	[F110, F111-OE]
	[F110, F111-OH2.1]
	[F110, F111-OH5]
(4)	[F110, F111-OE]
	[F110, F111-OH2.1]
	[F110, F111-OH5]
(5)	[F110, F111-OE]
	[F110, F111-OH2.1]
	[F110, F111-OH5]
8.7.3.1.	**Length of Distribution Pipe**
(1)	[F110, F111-OE]
	[F110, F111-OH2.1]
	[F110, F111-OH5]
(2)	[F110-OE]
	[F110-OH5]
(3)	[F110-OE]
	[F110-OH5]
(4)	[F110-OE]
	[F110-OH5]
8.7.3.2.	**Absorption Trenches**
(1)	[F110, F111-OE]
	[F110, F111-OH2.1]
	[F110, F111-OH5]
(2)	[F110, F111-OE]
	[F110, F111-OH2.1]
	[F110, F111-OH5]
8.7.3.3.	**Distribution Pipe**
(1)	[F111-OE]
	[F111-OH5]
(2)	[F111-OE]
	[F111-OH5]
(3)	[F110, F111-OE]
	[F110, F111-OH2.1]
	[F110, F111-OH5]
(4)	[F110, F111-OE]
	[F110, F111-OH2.1]
	[F110, F111-OH5]
(5)	
8.7.4.1.	**Loading Requirements**
(1)	[F110, F111-OE]
	[F110, F111-OH2.1]
	[F110, F111-OH5]
8.7.4.2.	**Construction Requirements**
(1)	[F110, F111-OE]
	[F110, F111-OH2.1]
	[F110, F111-OH5]
(2)	[F110, F111-OE]
	[F110, F111-OH2.1]
	[F110, F111-OH5]

Acceptable Solution	Objective and Functional Statement
(3)	[F110, F111-OE]
	[F110, F111-OH2.1]
	[F110, F111-OH5]
(4)	
(5)	[F110, F111-OE]
	[F110, F111-OH2.1]
	[F110, F111-OH5]
(6)	[F110, F111-OE]
	[F110, F111-OH2.1]
	[F110, F111-OH5]
(7)	[F110, F111-OE]
	[F110, F111-OH2.1]
	[F110, F111-OH5]
(8)	[F110, F111-OE]
	[F110, F111-OH2.1]
	[F110, F111-OH5]
(9)	[F110, F111-OE]
	[F110, F111-OH2.1]
	[F110, F111-OH5]
(10)	[F110, F111-OE]
	[F110, F111-OH2.1]
	[F110, F111-OH5]
(11)	[F110, F111-OE]
	[F110, F111-OH2.1]
	[F110, F111-OH5]
8.7.5.1.	**Application**
(1)	[F110, F111-OE]
	[F110, F111-OH2.1]
	[F110, F111-OH5]
8.7.5.2.	**Loading Requirements**
(1)	[F110, F111-OE]
	[F110, F111-OH2.1]
	[F110, F111-OH5]
(2)	[F110, F111-OE]
	[F110, F111-OH2.1]
	[F110, F111-OH5]
(3)	[F110, F111, F112-OE]
	[F110, F111, F112-OH2.1]
	[F110, F111, F112-OH5]
(4)	[F110, F111, F112-OE]
	[F110, F111, F112-OH2.1]
	[F110, F111, F112-OH5]
(5)	[F110, F111, F112-OE]
	[F110, F111, F112-OH2.1]
	[F110, F111, F112-OH5]
8.7.5.3.	**Construction Requirements**
(1)	
(2)	[F110, F112-OE]
	[F110, F112-OH2.1]
	[F110, F112-OH5]

Acceptable Solution	Objective and Functional Statement
(3)	[F110, F112-OE]
	[F110, F112-OH2.1]
	[F110, F112-OH5]
(4)	[F110, F111, F112-OE]
	[F110, F111, F112-OH2.1]
	[F110, F111, F112-OH5]
(5)	[F110, F111-OE]
	[F110, F111-OH2.1]
	[F110, F111-OH5]
(6)	[F110, F111, F112-OE]
	[F110, F111, F112-OH2.1]
	[F110, F111, F112-OH5]
(7)	
8.7.6.1.	**Limitation on Installation**
(1)	[F110, F111, F112-OE]
	[F110, F111, F112-OH2.1]
	[F110, F111, F112-OH5]
8.7.6.2.	**Construction Requirements**
(1)	[F112-OE]
	[F112-OH5]
(2)	[F110, F111, F112-OE]
	[F110, F111, F112-OH2.1]
	[F110, F111, F112-OH5]
(3)	[F110, F111-OE]
	[F110, F111-OH2.1]
	[F110, F111-OH5]
(4)	[F20-OS2.2]
(5)	[F110, F111-OE]
	[F110, F111-OH2.1]
	[F110, F111-OH5]
(6)	
8.8.1.1	**Prohibited Installation**
(1)	
8.8.1.2.	**Acceptable Installation**
(1)	[F110-OE]
	[F110-OH5]
(2)	[F82, F110-OE]
	[F82, F110-OH5]
8.8.2.1.	**Construction Requirements**
(1)	[F82, F110-OE]
	[F82, F110-OH5]
(2)	[F82, F110-OE]
	[F82, F110-OH5]
(3)	[F110-OE]
	[F110-OH5]
(4)	[F110-OE]
	[F110-OH5]
8.8.2.2.	**Sizing of Holding Tanks**
(1)	[F110, F111-OE]
	[F110, F111-OH2.1]
	[F110, F111-OH5]

Acceptable Solution	Objective and Functional Statement
8.9.1.1.	**Scope**
(1)	
8.9.1.2.	**General Requirements for Operation and Maintenance**
(1)	[F110-OE]
	[F110-OH5]
(2)	
8.9.2.1.	**Scope**
(1)	
8.9.2.2.	**General**
(1)	[F110, F111-OE]
	[F110, F111-OH2.1]
	[F110, F111-OH5]
8.9.2.3.	**Class 4 Sewage Systems**
(1)	[F110, F111-OE]
	[F110, F111-OH2.1]
	[F110, F111-OH5]
(2)	[F82, F110-OE]
	[F82, F110-OH5]
(3)	
8.9.2.4.	**Shallow Buried Trenches**
(1)	[F82, F110-OE]
	[F82, F110-OH5]
(2)	[F82, F110-OE]
	[F82, F110-OH5]
8.9.2.5.	**Class 5 Sewage Systems**
(1)	[F82, F110-OE]
	[F82, F110-OH5]
(2)	[F110-OE]
	[F110-OH5]
8.9.3.1.	**Scope**
(1)	
8.9.3.2.	**General**
(1)	[F110, F111-OE]
	[F110, F111-OH2.1]
	[F110, F111-OH5]
(2)	[F110, F111-OE]
	[F110, F111-OH2.1]
	[F110, F111-OH5]
(3)	
8.9.3.3.	**Interceptors**
(1)	[F110, F111-OE]
	[F110, F111-OH2.1]
	[F110, F111-OH5]
8.9.3.4.	**Class 4 Sewage Systems**
(1)	[F110, F111-OE]
	[F110, F111-OH2.1]
	[F110, F111-OH5]
8.9.3.5.	**Shallow Buried Trenches**
(1)	[F110, F111-OE]
	[F110, F111-OH2.1]
	[F110, F111-OH5]

Table 9
Objectives and Functional Statements Attributed to the Acceptable Solutions in Part 9 of Division B

Acceptable Solution	Objectives and Functional Statements
9.1.1.1.	**Scope**
(1)	
9.1.1.2.	**Signs**
(1)	
9.1.1.3.	**Self-Service Storage Buildings**
(1)	
9.1.1.4.	**Tents and Air-Supported Structures**
(1)	
(2)	
9.1.1.5.	**Proximity to Existing Above Ground Electrical Conductors**
(1)	
9.1.1.6.	**Food Premises**
(1)	
9.1.1.7.	**Radon**
(1)	[F40, F50-OH1.1]
9.1.1.8.	**Building in Flood Plains**
(1)	(a) [F20-OP2.1]
	(a) [F20-OS2.1, OS2.3]
	(a) [F61-OH1.3]
	(b) [F10, F12-OS3.1] [F10, F30-OS3.7]
9.1.1.9.	**Site Assembled and Factory-Built Buildings**
(1)	
(2)	
9.3.1.1.	**General**
(1)	[F20-OP2.1, OP2.4] [F21-OP2.3, OP2.4] [F80-OP2.3] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F21, F80-OH1.1] Applies where concrete supports or is used in the walls of chimneys or fireplaces. [F20, F21, F55, F61, F80-OH1.1, OH1.2] [F20, F21, F80, F61-OH1.3] Applies where concrete supports or is used in an environmental separator.
	[F20, F21, F80-OH4] Applies where concrete elements support wood-frame floors.
	[F20, F21, F80-OS1.1] Applies where concrete supports or is used in chimneys or fireplaces.
	[F20-OS2.1] [F21, F80-OS2.3] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F21, F80-OS3.1] Applies to concrete floors or steps, concrete that supports wood-frame floors or steps and concrete steps that support guards or handrails. [F20, F21, F80-OS3.4, OS3.7] Applies where concrete supports or is used in chimneys or fireplaces.
(2)	
(3)	

Acceptable Solution	Objectives and Functional Statements
(4)	[F20-OP2.1, OP2.4] [F21, F80-OP2.3, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator
	[F20, F21, F80-OH1.1] Applies where concrete supports or is used in the walls of *chimneys* or fireplaces [F20, F21, F55, F80, F61-OH1.1, OH1.2] [F20, F21, F80, F61-OH1.3] Applies to elements that support or are part of an environmental separator
	[F20, F21, F80-OH4] Applies to elements that support floors
	[F20, F80-OS1.1] Applies where concrete supports or is used in *chimneys* or fireplaces
	[F20-OS2.1] [F80-OS2.3] [F20-OS2.3] Applies to elements that support or are part of an environmental separator
	[F20, F80-OS3.1] Applies to concrete that supports wood-frame floors or steps [F20, F80-OS3.4, OS3.7] Applies where concrete supports or is used in *chimneys* or fireplaces
9.3.1.2.	**Cement**
(1)	[F20-OP2.1, OP2.4] [F80-OP2.3, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator
	[F20, F80-OH1.1] Applies where concrete supports or is used in the walls of *chimneys* or fireplaces [F20, F55, F61, F80-OH1.1, OH1.2] [F20, F61, F80-OH1.3] Applies where concrete supports or is used in an environmental separator
	[F20, F80-OH4] Applies where concrete elements support wood-frame floors
	[F20, F80-OS1.1] Applies where concrete supports or is used in *chimneys* or fireplaces
	[F20-OS2.1] [F80-OS2.3] [F20-OS2.3] Applies to elements that support or are part of an environmental separator
	[F20, F80-OS3.1] Applies to concrete floors or steps, concrete that supports wood-frame floors or steps, and concrete steps that support *guards* or handrails [F20, F80-OS3.4, OS3.7] Applies where concrete supports or is used in *chimneys* or fireplaces
9.3.1.3.	**Concrete in Contact with Sulfate Soil**
(1)	[F20-OP2.1, OP2.4] [F80-OP2.3, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator
	[F80-OH1] Applies where concrete supports or is used in the walls of *chimneys* or fireplaces [F80-OH1.1, OH1.2, OH1.3] Applies where concrete supports or is used in an environmental separator
	[F80-OH4] Applies where concrete elements support wood-frame floors
	[F80-OS1.1] Applies where concrete is used in footings for *chimneys* or fireplaces
	[F20-OS2.1] [F80-OS2.3] [F20-OS2.3] Applies to elements that support or are part of an environmental separator
	[F80-OS3.1] Applies to concrete floors or steps, concrete that supports wood-frame floors or steps, and concrete steps that support *guards* or handrails [F80-OS3.4, OS3.7] Applies where concrete supports or is used in *chimneys* or fireplaces

Acceptable Solution	Objectives and Functional Statements
9.3.1.4.	**Aggregates**
(1)	[F20-OP2.1, OP2.4] [F80-OP2.3, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F80-OS1.1] Applies to concrete used in *chimneys* or fireplaces.
	[F20-OS2.1] [F80-OS2.3] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F80-OS3.1] Applies to floors and elements that support floors. [F20, F80-OS3.4] Applies to concrete used in *chimneys* or fireplaces.
	[F20, F55, F61, F80-OH1.1, OH1.2] Applies to elements that support or are part of an environmental separator and to masonry used in *chimneys* and fireplaces. [F20, F61, F80-OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in *chimneys* and fireplaces.
	[F20, F80-OH4] Applies to floors and elements that support floors.
9.3.1.5.	**Water**
(1)	[F20-OP2.1, OP2.4] [F80-OP2.3, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F80-OS1.1] Applies where concrete supports or is used in *chimneys* or fireplaces.
	[F20-OS2.1] [F80-OS2.3] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F80-OS3.1] Applies to concrete floors or steps, concrete that supports wood-frame floors or steps, and concrete steps that support guards or handrails. [F20, F80-OS3.4, OS3.7] Applies where concrete supports or is used in *chimneys* or fireplaces.
	[F20, F55, F61, F80-OH1.1, OH1.2] Applies to elements that support or are part of an environmental separator and to masonry used in *chimneys* and fireplaces. [F20, F61, F80-OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in *chimneys* and fireplaces.
	[F20, F80-OH4] Applies where concrete elements support wood-frame floors.
9.3.1.6.	**Compressive Strength**
(1)	(a) [F20-OP2.1, OP2.4] (a) [F21-OP2.3, OP2.4] (a) [F80-OP2.3] (a) [F20-OP2.3] Applies to elements that support are part of an environmental separator.
	(a) [F20, F21, F80-OS1.1] Applies where concrete supports or is used in *chimneys* or fireplaces.
	(a) [F20-OS2.1] (a) [F21, F80-OP2.3] (a) [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	(a) [F20, F80-OS3.1] Applies to elements that support floors or steps. (a) [F20, F80-OS3.4, OS3.7] Applies where concrete supports or is used in *chimneys* or fireplaces.
	(a) [F20, F80-OH1.1] Applies where concrete supports or is used in the walls of *chimneys* or fireplaces. (a) [F20, F55, F61, F80-OH1.1, OH1.2] [F20, F61, F80-OH1.3] Applies where concrete supports or is used in an environmental separator.
	(a) [F20, F21, F80-OH4] Applies to elements that support floors.
	(b) [F20-OP2.1, OP2.4] (b) [F21-OP2.3, OP2.4] (b) [F80-OP2.3] (b) [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	(b) [F20-OS2.1] (b) [F21, F80-OS2.3] (b) [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	(b) [F20, F21, F80-OS3.1]
	(b) [F20, F21, F55, F61, F80-OH1.1, OH1.2] [F20, F21, F61, F80-OH1.3]

Acceptable Solution	Objectives and Functional Statements
	(c) [F20-OP2.1] [F20, F21, F80-OP2.3, OP2.4]
	(c) [F20-OS2.1] [F20, F21, F80-OS2.3]
	(c) [F20, F21, F80-OS3.1]
(2)	[F80-OS3.1]
9.3.1.7.	**Concrete Mixes**
(1)	(a) [F20-OP2.1, OP2.4] (a) [F21-OP2.3, OP2.4] (a) [F20, F55, F61-OP2.3] Applies to elements that support or are part of an environmental separator.
	(a) [F20, F21, F61-OS1.1] Applies where concrete supports or is used in *chimneys* or fireplaces.
	(a) [F20-OS2.1] (a) [F21-OS2.3] (a) [F20, F61, F55-OS2.3] Applies to elements that support or are part of an environmental separator.
	(a) [F20, F21, F61-OS3.1] Applies to concrete floors or steps, concrete that supports wood-frame floors or steps, and concrete steps that support *guards* or handrails. (a) [F20, F21, F61-OS3.4, OS3.7] Applies where concrete supports or is used in *chimneys* or fireplaces.
	(a) [F20, F21, F80-OH1.1] Applies where concrete supports or is used in the walls of *chimneys* or fireplaces. (a) [F20, F21, F80, F61, F55-OH1.1, OH1.2] [F20, F21, F80, F61-OH1.3] Applies where concrete supports or is used in an environmental separator.
	(a) [F20, F21, F61-OH4] Applies to elements that support floors.
	(b) [F20-OP2.1, OP2.4] (b) [F21-OP2.3, OP2.4] (b) [F80-OP2.3] (b) [F20-OP2.3] Applies where concrete is used in an environmental separator.
	(b) [F20, F21, F55, F61, F80-OH1.1, OH1.2] [F20, F21, F61, F80-OH1.3]
	(b) [F20-OS2.1] (b) [F21, F80-OS2.3] (b) [F20-OS2.3] Applies where concrete is used in an environmental separator.
	(b) [F20, F21, F80-OS3.1]
	(c) [F20, F21, F80-OP2.3, OP2.4]
	(c) [F20, F21-OS2.1] [F20, F21, F80-OS2.3]
	(c) [F20, F21, F80-OS3.1]
(2)	[F20-OP2.1, OP2.4] [F21-OP2.3, OP2.4] [F20, F61, F55-OP2.3] Applies where concrete supports or is used in an environmental separator.
	[F20, F21-OS1.1] Applies where concrete supports or is used in *chimneys* or fireplaces.
	[F20-OS2.1] [F21-OS2.3] [F20, F55, F61-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F80-OS3.1] Applies to concrete floors or steps, concrete that supports wood-frame floors or steps, and concrete steps that support *guards* or handrails. [F20, F80-OS3.1, OS3.7] Applies where concrete supports or is used in *chimneys* or fireplaces.
	[F20, F21, F55, F61-OH1.1] Applies where concrete supports or is used in the walls of *chimneys* or fireplaces. [F20, F21-OH1.2, OH1.3] Applies where concrete supports or is used in an environmental separator.
	[F20, F21, F55, F61-OH4] Applies where concrete elements support wood-frame floors.
9.3.1.8.	**Admixtures**
(1)	[F20-OP2.1, OP2.4] [F21-OP2.3, OP2.4] [F80-OP2.3, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F21, F80-OS1.1] Applies where concrete supports or is used in *chimneys* or fireplaces.
	[F20-OS2.1] [F21-OS2.3] [F20, F55, F61-OS2.3] Applies to elements that support or are part of an environmental separator.

Acceptable Solution	Objectives and Functional Statements
	[F20, F80-OS3.1] Applies to concrete floors or steps, concrete that supports wood-frame floors or steps, and concrete steps that support *guards* or handrails. [F20, F80-OS3.4, OS3.7] Applies where concrete supports or is used in *chimneys* or fireplaces.
	[F20, F80-OH1.1] Applies where concrete supports or is used in the walls of *chimneys* or fireplaces. [F20, F55, F61, F80-OH1.1, OH1.2] [F20, F61, F80-OH1.3] Applies where concrete supports or is used in an environmental separator.
	[F20, F21, F80-OH4] Applies where concrete elements support wood-frame floors.
9.3.1.9.	**Cold Weather Requirements**
(1)	[F20-OP2.1, OP2.4] [F21, F80-OP2.3, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F21, F80-OS1.1] Applies where concrete supports or is used in *chimneys* or fireplaces.
	[F20-OS2.1] [F21-OS2.3] [F20-OS2.3] Applies to elements that support or are part of en environmental separator.
	[F20, F80-OS3.1] Applies to concrete floors or steps, concrete that supports wood-frame floors or steps, and concrete steps that support *guards* or handrails. [F20, F80-OS3.4, OS3.7] Applies where concrete supports or is used in *chimneys* or fireplaces.
	[F20, F80-OH1.1] Applies where concrete supports or is used in the walls of *chimneys* or fireplaces. [F20, F55, F61, F80-OH1.1, OH1.2] [F20, F61, F80-OH1.3] Applies where concrete supports or is used in an environmental separator.
	[F20, F21, F80-OH4] Applies where concrete elements support wood-frame floors.
(2)	[F20-OH1.1] Applies where concrete supports or is used in the walls of *chimneys* or fireplaces. [F20, F55, F61-OH1.1, OH1.2] [F20, F61-OH1.3] Applies where concrete supports or is used in an environmental separator.
	[F20, F55, F61-OH4] Applies to elements that support floors.
	[F20-OP2.1, OP2.4] [F20, F55, F61-OP2.3] [F55, F61-OP2.4] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.1] Applies to concrete that supports or is used in *chimneys* or fireplaces.
	[F20-OS2.1] [F20, F55, F61-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F55, F61-OS3.1] Applies to floors and elements that support floors. [F20, F55, F61-OS3.4] Applies to concrete that supports or is used in *chimneys* or fireplaces.
9.3.2.1.	**Grade Marking**
(1)	
9.3.2.2.	**Lumber Grades**
(1)	[F20-OP2.1, OP2.4] [F22-OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, or elements that support walls, that contain doors or windows required for emergency egress.
9.3.2.3.	**Machine Stress Rated Lumber**
(1)	
9.3.2.4.	**OSB, Waferboard and Plywood Marking**
(1)	
9.3.2.5.	**Moisture Content**
(1)	[F21, F80-OP2.3, OP2.4]

Acceptable Solution	Objectives and Functional Statements
	[F21, F80-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F21, F80-OH4] Applies to floors and elements that support floors.
	[F21, F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F21, F80-OS2.3]
	[F21, F80-OS3.1] Applies to floors and elements that support floors.
9.3.2.6.	**Lumber Dimensions**
(1)	
9.3.2.7.	**Panel Thickness Tolerances**
(1)	
9.3.2.8.	**Undersized Lumber**
(1)	[F20-OP2.1, OP2.4] [F22-OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
9.3.2.9.	**Termite and Decay Protection**
(1)	[F80, F82-OP2.3, OP2.4]
	[F80, F82-OS1.2] Applies where wood elements support or are used in assemblies that are required to provide fire resistance.
	[F80, F82-OS2.3]
	[F80, F82-OS3.1] Applies where structural wood elements support or are used in floors.
	[F55, F61, F80, F82-OH1.1, OH1.2] Applies where structural wood elements support or are used in an environmental separator.
	[F80, F82-OH4] Applies where structural wood elements support or are used in floors.
(2)	[F80, F82-OP2.3, OP2.4]
	[F80, F82-OS2.1] Applies where structural wood elements support or are used in assemblies that are required to provide fire resistance.
	[F80, F82-OS2.3]
	[F80, F82-OS3.1] Applies where structural wood elements support or are used in floors.
	[F55, F61, F82, F80-OH1.1, OH1.2] [F61, F80, F82-OH1.3] Applies where structural wood elements support or are used in an environmental separator.
	[F80, F82-OH4] Applies where structural wood elements support or are used in floors.
(3)	[F80-OP2.3, OP2.4]
	[F80-OS1.2] Applies where structural wood elements support or are used in assemblies that are required to provide fire resistance.
	[F80-OS2.3]
	[F80-OS3.1] Applies where structural wood elements support or are used in floors.
	[F55, F61, F80, F82-OH1.1, OH1.2] [F61, F80, F82-OH1.3] Applies where structural wood elements support or are used in an environmental separator.
	[F80-OH4] Applies where structural wood elements support or are used in floors.
(4)	[F80-OP2.3, OP2.4, OP2.5]
	[F80-OS1.2] Applies where cribbing or retaining walls support assemblies that are required to provide fire resistance.
	[F80-OS2.3, OS2.5]
	[F80-OS3.1] Applies where cribbing or retaining walls support floors.
	[F55, F61, F80-OH1.1, OH1.2] [F61, F80-OH1.3] Applies where cribbing or retaining walls support an environmental separator.
	[F80-OH4] Applies to floors and elements that support floors.

Acceptable Solution	Objectives and Functional Statements
(5)	[F80, F81-OP2.3, OP2.4]
	[F80, F81-OS1.2] Applies where structural wood elements support or are used in assemblies that are required to provide fire resistance.
	[F80, F81-OS2.3]
	[F80, F81-OS3.1] Applies where structural wood elements support or are used in floors.
	[F55, F61, F80, F81-OH1.1, OH1.2] [F61, F80, F81-OH1.3] Applies where structural wood elements support or are used in an environmental separator.
	[F80, F81-OH4] Applies where structural wood elements support wood-frame floors.
(6)	[F20, F61-OP2.3, OP2.4]
	[F80, F81-OS1.2] Applies where structural wood elements support or are used in assemblies that are required to provide fire resistance.
	[F20, F60-OS2.3]
	[F20, F61-OS3.1] Applies where structural wood elements support or are used in floors.
	[F20, F55, F61-OH1.1, OH1.2] [F20, F61-OH1.3] Applies where structural wood elements support or are used in an environmental separator.
	[F61, F80-OH4] Applies to floors and elements that support floors.
(7)	
9.3.3.1.	**Sheet Metal Thickness**
(1)	
9.3.3.2.	**Galvanized Sheet Steel**
(1)	[F80-OP2.3, OP2.4]
	[F80-OH1.1, OH1.2, OH1.3] Applies where sheet metal is used in an environmental separator.
	[F80-OH4.1] Applies where sheet metal is used in assemblies that support floors.
	[F80-OS2.3]
	[F80-OS3.1] Applies where sheet metal is used in assemblies that support floors.
(2)	[F80-OH1.1, OH1.2, OH1.3]
	[F80-OP2.3]
	[F80-OS2.3]
9.4.1.1.	**General**
(1)	
(2)	
(3)	
9.4.2.1.	**Application**
(1)	
9.4.2.2.	**Specified Design Snow Loads**
(1)	[F20-OP2.1, OP2.3] [F22-OP2.3]
	[F20-OS2.1, OS2.3] [F22-OS2.3]
	[F22-OH1.1, OH1.2, OH1.3]
(2)	[F20-OP2.1]
	[F20-OS2.1]
(3)	
9.4.2.3.	**Platforms Subject to Snow and Occupancy Loads**
(1)	[F20-OP2.1]
	[F20-OS2.1]
9.4.2.4.	**Attics and Roof Spaces**
(1)	[F20-OP2.1]
	[F20-OS2.1]
9.4.3.1.	**Deflections**
(1)	[F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4]
	[F22-OP2.1, OP2.4] [F22-OP2.3] Applies to elements that support or are part of an environmental separator.

Acceptable Solution	Objectives and Functional Statements
	[F22-OS2.3] Applies to elements that support or are part of an environmental separator. [F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	
9.4.4.1.	**Allowable Bearing Pressures**
(1)	[F20-OH1.1, OH1.2, OH1.3] Applies to footings that support an environmental separator. [F20-OH4] Applies to footings that support floors and other elements that support floors. [F20-OP2.2, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator. [F20-OS2.2] [F20-OS2.3] Applies to elements that support or are part of an environmental separator. [F20-OS3.1] Applies to footings that support floors and other elements that support floors. [F20-OS3.7] Applies to footings that support walls that contain doors or windows required for emergency egress.
(2)	
(3)	
9.4.4.2.	**Foundation Capacity in Weaker Soil and Rock**
(1)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator. [F20-OH4] Applies to floors and elements that support floors. [F20-OP2.2, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator. [F20-OS2.2] [F20-OS2.3] Applies to elements that support or are part of an environmental separator. [F20-OS3.1] Applies to floors and elements that support floors.
(2)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator. [F20-OH4] Applies to floors and elements that support floors. [F20-OP2.2, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator. [F20-OS2.2] [F20-OS2.3] Applies to elements that support or are part of an environmental separator. [F20-OS3.1] Applies to floors and elements that support floors.
9.4.4.3.	**High Water Table**
(1)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator. [F20-OH4] Applies to floors and elements that support floors. [F20-OP2.2, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator. [F20-OS2.2] [F20-OS2.3] Applies to elements that support or are part of an environmental separator. [F20-OS3.1] Applies to floors and elements that support floors.
9.4.4.4.	**Soil Movement**
(1)	[F21-OH1.1, OH1.2, OH1.3] Applies to walls that support or are part of an environmental separator. [F21-OH4] Applies to foundations that support floors and other elements that support floors. [F21-OP2.1, OP2.4] [F21-OP2.3] Applies to elements that support or are part of an environmental separator. [F21-OS2.1] [F21-OS2.3] Applies to elements that support or are part of an environmental separator. [F21-OS3.1] Applies to footings that support floors and other elements that support floors. [F21-OS3.7] Applies to footings that support walls that contain doors or windows required for emergency egress.
(2)	
9.4.4.5.	**Reserved**
9.4.4.6.	**Wall Supporting Drained Earth**
(1)	[F20-OH1.1, OH1.2, OH1.3] [F20-OH4] Applies to floors and elements that support floors.

Acceptable Solution	**Objectives and Functional Statements**
	[F20-OP2.1, OP2.3, OP2.4]
	[F20-OS2.1, OS2.3]
	[F20-OS3.1] Applies to floors and elements that support floors. [F20-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1, OP2.3, OP2.4]
	[F20-OS2.1, OS2.3]
	[F20-OS3.1] Applies to floors and elements that support floors. [F20-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.5.1.1.	**Application**
(1)	
9.5.1.2.	**Method of Measurement**
(1)	
9.5.1.3.	**Floor Areas**
(1)	
9.5.1.4.	**Combination Rooms**
(1)	
(2)	[F10-OS3.7]
(3)	
9.5.1.5.	**Lesser Areas and Dimensions**
(1)	
9.5.2.1.	**General**
(1)	
(2)	
9.5.2.2.	**Protection on Floor Areas with a Barrier-Free Path of Travel**
(1)	
9.5.2.3.	**Stud Wall Reinforcement**
(1)	[F74-OA2]
9.5.3.1.	**Ceiling Heights of Rooms or Spaces**
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	
9.5.3.2.	**Mezzanines**
(1)	[F30-OS3.1] [F10-OS3.7]
9.5.3.3.	**Storage Garages**
(1)	[F30-OS3.1] [F10-OS3.7]
9.5.4.1.	**Areas of Living Rooms and Spaces**
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
9.5.5.1.	**Area of Dining Rooms or Spaces**
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
9.5.6.1.	**Kitchen Areas**
(1)	[F10-OS3.7]
9.5.7.1.	**Areas of Bedrooms**
(1)	[F10-OS3.7]
9.5.7.2.	**Areas of Master Bedrooms**
(1)	[F10-OS3.7]
9.5.7.3.	**Areas of Combination Bedrooms**
(1)	[F10-OS3.7]

Acceptable Solution	Objectives and Functional Statements
9.5.7.4.	**Areas of Other Sleeping Rooms**
(1)	[F10-OS3.7]
9.5.7.5.	**Recreational Camps**
(1)	[F10-OS3.7]
9.5.7.6.	**Camps for Housing Workers**
(1)	[F10-OS3.7]
9.5.8.1.	**Combined Living, Dining, Bedroom and Kitchen Spaces**
(1)	[F10-OS3.7]
9.5.9.1.	**Space to Accommodate Fixtures**
(1)	[F70, F71-OH2.3]
	[F101-OH6]
9.5.10.1.	**Width of Hallway Within Dwelling Unit**
(1)	[F10-OS3.7]
9.6.1.1.	**Application**
(1)	
9.6.2.1.	**Doors for Dwelling Units**
(1)	[F40, F42, F61-OH1.1] [F51, F54-OH1.2]
	[F42-OH2.5] Applies to portion of Code text: "at each entrance to a *dwelling unit*"
	[F101-OH6] Applies to portion of Code text: "to each room containing a water closet"
	[F131-OR2] Applies to portion of Code text: "at each entrance to a *dwelling unit*"
	[F42, F61-OS2.3] Applies to portion of Code text: "at each entrance to a *dwelling unit*"
9.6.3.1.	**Doorway Opening Sizes**
(1)	[F30-OS3.1] [F10-OS3.7]
9.6.3.2.	**Doors to Public Water Closet Rooms**
(1)	[F30-OS3.1] [F10-OS3.7]
9.6.3.3.	**Doors to Bathrooms**
(1)	[F74-OA2]
9.6.4.1.	**Height of Door Sills Above Floors or Ground**
(1)	[F30-OS3.1] [F10-OS3.7]
9.6.5.1.	**Exterior Wood Flush Doors**
(1)	[F40, F42, F61-OH1.1] [F51, F54-OH1.2]
	[F42-OH2.5]
	[F42, F42-OS2.3]
	[F80-OS3.7]
	[F80-OS4.1]
(2)	
9.6.5.2.	**Sliding Doors**
(1)	[F40, F42, F61-OH1.1] [F51, F54-OH1.2]
	[F42-OH2.5]
	[F42, F61-OS2.3]
	[F80-OS3.1]
	[F80-OS4.1]
9.6.5.3.	**Insulated Steel Doors**
(1)	[F40, F42, F61-OH1.1] [F51, F54-OH1.2]
	[F42-OH2.5]
	[F42, F61-OS2.3]
	[F80-OS3.7]
	[F80-OS4.1]
9.6.5.4.	**Air Infiltration for Exterior Swing Type Doors**
(1)	[F53, F54-OH1.2] [F63-OH1.1, OH1.2]
	[F131-OR2]

Acceptable Solution	Objectives and Functional Statements
	[F63-OS2.3]
9.6.5.5.	**Air Infiltration for Patio Type Sliding Doors**
(1)	[F53, F54-OH1.2] [F63-OH1.1, OH1.2]
	[F131-OR2]
	[F63-OS2.3]
9.6.5.6.	**Weather Stripping**
(1)	[F53, F54-OH1.2] [F63-OH1.1, OH1.2]
	[F131-OR2]
	[F63-OS2.3]
9.6.6.1.	**Maximum Area of Glass**
(1)	[F30-OS3.1] [F10-OS3.7]
9.6.6.2.	**Glass in Doors and Sidelights**
(1)	
(2)	[F30-OS3.1] [F10-OS3.7]
(3)	[F30-OS3.1] [F10-OS3.7]
9.6.6.3.	**Mirrored Glass Doors**
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
9.6.6.4.	**Visibility of Glass or Transparent Doors**
(1)	[F30-OS3.1] [F10-OS3.7]
9.6.6.5.	**Glass for Shower or Bathtub Enclosures**
(1)	[F30-OS3.1]
9.6.7.1.	**Application**
(1)	
9.6.7.2.	**Required Thermal Breaks**
(1)	[F63-OH1.1, OH1.2]
	[F63-OS2.3]
	[F131-OR2]
(2)	
9.6.8.1.	**Application**
(1)	
(2)	
9.6.8.2.	**Wood Doors**
(1)	[F20-OS4.1]
9.6.8.3.	**Deadbolt Lock**
(1)	[F34-OS4.1]
9.6.8.4.	**Double Doors**
(1)	[F34-OS4.1]
9.6.8.5.	**Fastening of Hinges**
(1)	[F20-OS4.1]
(2)	[F20-OS4.1]
9.6.8.6.	**Fastening of Strikeplates**
(1)	[F20-OS4.1]
(2)	[F20-OS4.1]
9.6.8.7.	**Outward Swinging Doors**
(1)	[F34-OS4.1]
9.6.8.8.	**Door Viewer**
(1)	[F35-OS4.2]
9.6.8.9.	**Solid Blocking**
(1)	[F20-OS4.1]
9.6.8.10.	**Alternate Test Procedure**

Acceptable Solution	Objectives and Functional Statements
(1)	[F34-OS4.1]
9.7.1.1.	**Application**
(1)	
9.7.1.2.	**Minimum Window Areas**
(1)	[F102-OH7]
	[F10-OS3.7]
(2)	
(3)	
(4)	
9.7.1.3.	**Bedroom Windows**
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
(3)	
(4)	
9.7.1.4.	**Window Opening into a Window-Well**
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
(3)	[F10-OS3.7]
9.7.1.5.	**Termites**
(1)	[F55, F61, F80, F82-OH1.1, OH1.2]
	[F42-OP2.3]
	[F42-OS2.3]
9.7.1.6.	**Height of Window Sills above Floors or Ground**
(1)	[F30-OS3.1]
(2)	
9.7.1.7.	**Air Infiltration of Exterior Windows**
(1)	[F53, F54-OH1.2] [F63-OH1.1, OH1.2]
	[F131-OR2]
	[F63-OS2.3]
9.7.2.1.	**Window Standard**
(1)	[F10-OS1.5] Applies where windows serve bedrooms, except bedrooms that have direct access to the exterior through an exit door or bedrooms that are in *sprinklered suites*.
	[F20, F21, F61, F63-OS2.3]
	[F55, F61, F62, F63-OH1.1] [F81-OH1.1] Applies to windows that provide required non-heating-season ventilation. [F54, F55, F61, F62, F63-OH1.2] [F61, F62, F63-OH1.3]
9.7.3.1.	**Glass Standards**
(1)	[F20-OS2.1] [F63-OS2.3]
	(e), (h) [F63-OH1.1] [F51, F63-OH1.2]
	(g) [F03-OS1.2]
9.7.3.2.	**Structural Design of Glass**
(1)	[F20-OS2.1]
9.7.4.1.	**Sealing Compound**
(1)	[F61, F63-OS2.3]
	[F61, F63-OH1.1, OH1.3] [F51, F54, F61, F63-OH1.2]
9.7.4.2.	**Caulking Compound**
(1)	
9.7.5.1.	**Transparent Panels**
(1)	[F30-OS3.1] [F10-OS3.7]
9.7.5.2.	**Sliding Glass Partitions**
(1)	[F30-OS3.1] [F10-OS3.7] Applies to portion of Code text: "... except that such *partitions* shall be suitably marked to indicate their existence and position."

Acceptable Solution	Objectives and Functional Statements
9.7.5.3.	**Windows over Stairs, Ramps and Landings**
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
9.7.5.4.	**Windows above the Second Storey**
(1)	[F30-OS3.7]
9.7.6.1.	**Forced Entry Through Windows**
(1)	[F34-OS4.1]
9.7.7.1.	**Plastic Skylights**
(1)	[F20-OS2.1] [F61, F63-OS2.3]
	[F30-OS3.1]
	[F61, F63-OH1.1] [F61-OH1.3]
9.7.7.2.	**Glass Skylights**
(1)	[F20-OS1.2] [F61, F63-OS2.3]
	[F30-OS3.1]
	[F61, 63-OH1.1] [F61-OH1.2, OH1.3]
9.8.1.1.	**General**
(1)	
9.8.1.2.	**Exit Stairs, Ramps and Landings**
(1)	
9.8.1.3.	**Escalators and Moving Walkways**
(1)	
9.8.2.1.	**Stair Width**
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
9.8.2.2.	**Height over Stairs**
(1)	[F30-OS3.1] [F10-OS3.7]
9.8.3.1.	**Straight and Curved Runs in Stairs**
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F10-OS3.7]
9.8.3.2	**Minimum Number of Risers**
(1)	[F30-OS3.1] [F10-OS3.7]
9.8.3.3.	**Maximum Height of Stairs**
(1)	[F30-OS3.1]
9.8.4.1.	**Uniformity and Tolerances for Risers and Treads**
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
(3)	[F30-OS3.1] [F10-OS3.7]
(4)	[F30-OS3.1] [F10-OS3.7]
(5)	[F30-OS3.1] [F10-OS3.7]
9.8.4.2.	**Dimensions for Risers**
(1)	[F30-OS3.1] [F10-OS3.7]
9.8.4.3.	**Dimensions for Rectangular Treads**
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
9.8.4.4.	**Dimensions for Angled Treads**
(1)	
(2)	[F30-OS3.1] [F10-OS3.7]
(3)	[F30-OS3.1] [F10-OS3.7]
9.8.4.5.	**Winders**
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]

Acceptable Solution	Objectives and Functional Statements
9.8.4.6.	**Leading Edges of Treads**
(1)	[F30-OS3.1] [F10-OS3.7]
9.8.4.7.	**Interior Stairs Extending Through the Roof**
(1)	[F30-OS3.1] [F10-OS3.7]
9.8.5.1.	**Application**
(1)	
(2)	
9.8.5.2.	**Ramp Width**
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
9.8.5.3.	**Height over Ramps**
(1)	[F30-OS3.1] [F10-OS3.7]
9.8.5.4.	**Slope**
(1)	[F30-OS3.1] [F10-OS3.7]
9.8.5.5.	**Maximum Rise**
(1)	[F30-OS3.1]
9.8.6.1.	**Application**
(1)	
(2)	
(3)	
9.8.6.2.	**Required Landings**
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	
(3)	
(4)	
9.8.6.3.	**Dimensions of Landings**
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
(3)	[F30-OS3.1] [F10-OS3.7]
(4)	[F30-OS3.1] [F10-OS3.7]
9.8.6.4.	**Height over Landings**
(1)	[F30-OS3.1] [F10-OS3.7]
9.8.7.1.	**Required Handrails**
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	
(3)	
9.8.7.2.	**Continuity of Handrails**
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
9.8.7.3.	**Termination of Handrails**
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
9.8.7.4.	**Height of Handrails**
(1)	
(2)	[F30-OS3.1] [F10-OS3.7]
(3)	[F30-OS3.1] [F10-OS3.7]
9.8.7.5.	**Ergonomic Design**
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
9.8.7.6.	**Projections into Stairs and Ramps**
(1)	[F30-OS3.1] [F10-OS3.7]

Acceptable Solution	Objectives and Functional Statements
9.8.7.7.	**Design and Attachment of Handrails**
(1)	[F20-OS2.1]
	[F20-OS3.1, OS3.7]
(2)	[F20-OS2.1]
	[F20-OS3.1, OS3.7]
9.8.8.1.	**Required Guards**
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	
(3)	[F30-OS3.1] [F10-OS3.7]
9.8.8.2.	**Loads on Guards**
(1)	[F20-OS2.1]
(2)	
(3)	
(4)	
(5)	
9.8.8.3.	**Height of Guards**
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
(3)	[F30-OS3.1] [F10-OS3.7]
(4)	[F30-OS3.1] [F10-OS3.7]
(5)	
9.8.8.4.	**Guards for Floors and Ramps in Garages**
(1)	[F10-OS3.1]
9.8.8.5.	**Openings in Guards**
(1)	[F30-OS3.1]
(2)	[F30-OS3.1]
(3)	[F30-OS3.1]
9.8.8.6.	**Design to Prevent Climbing**
(1)	[F30-OS3.1]
(2)	[F30-OS3.1]
9.8.8.7.	**Glass in Guards**
(1)	[F20-OS2.1]
	[F20-OS3.1, OS3.7]
9.8.9.1.	**Loads on Stairs and Ramps**
(1)	[F20-OS2.1]
	[F22-OH4]
9.8.9.2.	**Exterior Concrete Stairs**
(1)	[F22-OS3.1, OS3.7]
(2)	
(3)	
9.8.9.3.	**Exterior Wood Steps**
(1)	[F80-OS2.3]
	[F80-OS3.1, OS3.7]
9.8.9.4.	**Wooden Stair Stringers**
(1)	[F20-OS2.1]
	[F22-OH4]
(2)	[F20-OS2.1]
	[F22-OH4]
9.8.9.5.	**Treads**
(1)	[F20-OS2.1]
	[F22-OH4]

Acceptable Solution	Objectives and Functional Statements
(2)	[F20-OS2.1]
	[F22-OH4]
9.8.9.6.	**Finish for Treads, Landings and Ramps**
(1)	[F30, F80-OS3.1] [F10-OS3.7]
(2)	
(3)	[F30-OS3.1] [F10-OS3.7]
(4)	[F30-OS3.1] [F10-OS3.7]
9.8.10.1.	**Design**
(1)	[F20-OS2.1]
	[F22-OS3.1, OS3.7]
9.8.10.2.	**Anchorage**
(1)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OS2.1]
	[F22-OS3.1, OS3.7]
9.8.10.3.	**Prevention of Damage Due to Frost**
(1)	[F21-OH1.1, OH1.2, OH1.3]
	[F21-OS2.1]
	[F21-OS3.1]
9.9.1.1.	**Application**
(1)	
9.9.1.2.	**Fire Protection**
(1)	
9.9.1.3.	**Occupant Load**
(1)	
9.9.2.1.	**Types of Exits**
(1)	
(2)	
(3)	[F04-OP1.2, OP1.3] [F06, F12, F81-OP1.2]
	[F80-OP2.3]
	[F04-OS1.2, OS1.3] [F05, F10, F12-OS1.5] [F06-OS1.2]
	[F20, F80-OS2.1] [F80, F81-OS2.3]
	[F20, F30-OS3.1] [F10, F12-OS3.7]
(4)	
9.9.2.2.	**Purpose of Exits**
(1)	[F10-OS3.7] Applies to portion of Code text: "An *exit* shall be designed for no purpose other than exiting, ..."
9.9.2.3.	**Elevators, Slide Escapes and Windows as Means of Egress**
(1)	[F10-OS3.7]
(2)	
9.9.2.4	**Principle Entrances**
(1)	[F10-OS3.7]
9.9.2.5.	**Front Edge of Stair Treads**
(1)	[F30-OS1.5]
	[F30-OS3.1]
9.9.2.6.	**Exterior Exit Stairs that Serve a Hotel**
(1)	[F30-OS1.5]
	[F30-OS3.1]
9.9.3.1.	**Application**
(1)	
9.9.3.2.	**Exit Width**
(1)	[F10-OS3.7]
9.9.3.3.	**Width of Corridors**

Acceptable Solution	Objectives and Functional Statements
(1)	[F30-OS3.1] [F10-OS3.7]
9.9.3.4.	**Clear Height**
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
9.9.4.1.	**Application**
(1)	
9.9.4.2.	**Fire Separation for Exits**
(1)	[F03-OP1.2]
	[F03-OS1.2] [F05-OS1.5]
(2)	[F03-OP1.2]
	[F03-OS1.2] [F05-OS1.5]
(3)	[F05-OS1.5]
(4)	[F03-OS1.2] [F05-OS1.5]
(5)	
9.9.4.3.	**Wired Glass or Glass Block**
(1)	
(2)	[F05-OS1.5]
(3)	
9.9.4.4.	**Openings Near Unenclosed Exit Stairs and Ramps**
(1)	[F05-OS1.5]
9.9.4.5.	**Openings in Exterior Walls of Exits**
(1)	[F05-OS1.5]
9.9.4.6.	**Openings Near Exit Doors**
(1)	
(2)	[F05-OS1.5]
9.9.4.7.	**Stairways in Group D or E Buildings**
(1)	[F05-OS1.5]
(2)	
9.9.5.1.	**Application**
(1)	
9.9.5.2.	**Occupancies in Corridors**
(1)	[F10-OS3.7]
9.9.5.3.	**Obstructions in Public Corridors**
(1)	[F30-OS3.1]
(2)	
9.9.5.4.	**Obstructions in Exits**
(1)	[F10-OS3.7]
9.9.5.5.	**Obstructions in Means of Egress**
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
(3)	
9.9.5.6.	**Mirrors or Draperies**
(1)	[F30-OS3.1] [F10-OS3.7]
9.9.5.7.	**Fuel-Fired Appliances**
(1)	[F10-OS1.5]
	[F10-OS3.7]
9.9.5.8.	**Service Rooms**
(1)	[F30-OS3.1] [F10-OS3.7]
9.9.5.9.	**Ancillary Rooms**
(1)	[F05, F06-OS1.5]
	[F10-OS3.7]

Acceptable Solution	Objectives and Functional Statements
9.9.6.1.	**Obstructions by Doors**
(1)	
(2)	[F30-OS3.1] [F10-OS3.7]
(3)	[F30-OS3.1] [F10-OS3.7]
(4)	
9.9.6.2.	**Clear Opening Height at Doorways**
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
(3)	
9.9.6.3.	**Clear Opening Width at Doorways**
(1)	
(2)	[F30-OS3.1] [F10-OS3.7]
(3)	[F30-OS3.1] [F10-OS3.7]
(4)	
9.9.6.4.	**Door Action**
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
(3)	
(4)	
(5)	
9.9.6.5.	**Direction of Door Swing**
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
(3)	[F10-OS3.7]
(4)	[F10-OS3.7]
9.9.6.6.	**Proximity of Doors to Stairs**
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F10-OS3.7]
9.9.6.7.	**Door Latching, Locking and Opening Mechanisms**
(1)	(a) [F10-OS3.7]
	(b) [F10, F81-OS3.7]
(2)	[F10-OS3.7]
(3)	[F10-OS3.7]
	[F73-OA1]
(4)	[F10-OS3.7]
9.9.6.8.	**Effort Required to Open**
(1)	[F10-OS3.7]
9.9.7.1.	**Egress from Roof Area, Podiums, Terraces, Platforms and Contained Open Spaces**
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
(3)	
9.9.7.2.	**Means of Egress from Suites**
(1)	[F10-OS1.5]
(2)	[F10-OS3.7]
9.9.7.3.	**Dead End Corridors**
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
(3)	[F31-OS1.2] [F05-OS1.5]
	[F30-OS3.1] [F10-OS3.7]
9.9.7.4.	**Number and Spacing of Egress Doors**
(1)	[F10-OS3.7]

Acceptable Solution	Objectives and Functional Statements
(2)	[F10-OS1.5]
9.9.7.5.	**Independent Access to Exit**
(1)	[F10-OS3.7]
9.9.7.6.	**Travel Distance within Rooms and Suites**
(1)	
9.9.8.1.	**Measurement of Travel Distance**
(1)	
(2)	
(3)	
9.9.8.2.	**Number of Required Exits**
(1)	[F10-OS3.7]
(2)	
(3)	
9.9.8.3.	**Contribution of Each Exit**
(1)	[F10-OS3.7]
9.9.8.4.	**Location of Exits**
(1)	[F10-OS1.5]
9.9.8.5.	**Exiting through a Lobby**
(1)	[F10-OS1.5]
(2)	[F10-OS1.5]
(3)	[F10-OS1.5]
(4)	[F10-OS1.5]
(5)	[F10-OS1.5]
(6)	[F10-OS1.5]
(7)	[F10-OS1.5]
9.9.8.6.	**Mezzanine Means of Egress**
(1)	[F05-OS1.5]
(2)	
(3)	
(4)	[F05-OS1.5]
9.9.9.1.	**Travel Limit to Exits or Egress Doors**
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
(3)	[F10-OS3.7]
9.9.9.2.	**Two Separate Exits**
(1)	[F10-OS3.7]
9.9.9.3.	**Shared Egress Facilities**
(1)	[F10-OS3.7]
9.9.10.1.	**Application**
(1)	
9.9.10.2.	**Visibility of Exits**
(1)	[F10-OS3.7]
9.9.10.3.	**Required Exit Signs**
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
9.9.10.4.	**Exit Direction Signs**
(1)	[F10-OS3.7]
9.9.10.5.	**Visibility of Exit Signs**
(1)	[F10-OS3.7]
9.9.10.6.	**Lettering**
(1)	[F10-OS3.7]

Acceptable Solution	Objectives and Functional Statements
(2)	[F10-OS1.5]
	[F10-OS3.7]
(3)	
9.9.10.7.	**Illumination**
(1)	
(2)	[F10-OS3.7]
9.9.10.8.	**Signs for Stairs and Ramps at Exit Level**
(1)	[F10-OS3.7]
9.9.10.9.	**Floor Numbering**
(1)	[F10-OS3.7]
	[F73-OA1]
9.9.11.1.	**Application**
(1)	
9.9.11.2.	**Required Lighting in Egress Facilities**
(1)	[F30-OS3.1] [F10-OS3.7]
9.9.11.3.	**Emergency Lighting**
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
(3)	[F30-OS3.1] [F10-OS3.7]
(4)	[F30-OS3.1] [F10-OS3.7]
(5)	
(6)	[F30-OS3.1] [F10-OS3.7]
9.10.1.1.	**Support of Noncombustible Construction**
(1)	[F04-OP1.3]
	[F04-OS1.3]
9.10.1.2.	**Sloped Roofs**
(1)	
9.10.1.3.	**Items Under Part 3 Jurisdiction**
(1)	
(2)	
(3)	
(4)	
(5)	
(6)	
(7)	
(8)	
9.10.1.4.	**Items Under Part 6 Jurisdiction**
(1)	
(2)	
9.10.2.1.	**Occupancy Classification**
(1)	
9.10.2.2.	**Custodial and Convalescent Homes**
(1)	
9.10.2.3.	**Major Occupancies above Other Major Occupancies**
(1)	
9.10.2.4.	**Buildings Containing More Than One Major Occupancy**
(1)	
9.10.2.5.	**Restaurants**
(1)	
9.10.3.1.	**Fire-Resistance and Fire-Protection Ratings**
(1)	

Acceptable Solution	Objectives and Functional Statements
9.10.3.2.	**Flame-Spread Rating**
(1)	
(2)	
9.10.3.3.	**Fire Exposure**
(1)	
(2)	
(3)	
9.10.3.4.	**Suspended Membrane Ceiling**
(1)	[F03-OP1.3]
	[F04-OS1.3]
9.10.4.1.	**Mezzanines not Considered as Storeys**
(1)	
(2)	
9.10.4.2.	**More Than One Level of Mezzanine**
(1)	
9.10.4.3.	**Basement Storage Garage**
(1)	
9.10.4.4.	**Roof-Top Enclosures**
(1)	
9.10.5.1.	**Permitted Openings in Wall and Ceiling Membranes**
(1)	[F03-OP1.2] [F04-OP1.3]
	[F03-OS1.2] [F04-OS1.3]
(2)	[F04-OP1.3]
	[F04-OS1.3]
(3)	[F03-OP1.2]
	[F03-OS1.2]
(4)	[F04-OP1.3]
	[F04-OS1.2, OS1.3]
9.10.6.1.	**Combustible Elements in Noncombustible Construction**
(1)	
9.10.6.2.	**Heavy Timber Construction**
(1)	
9.10.7.1.	**Protection of Structural Steel Members**
(1)	[F03-OP1.2] [F04-OP1.3]
	[F03-OS1.2] [F04-OS1.3]
9.10.8.1.	**Fire-Resistance Ratings for Floors and Roofs**
(1)	[F03-OP1.2] [F04-OP1.2, OP1.3] Applies to portion of Code text: "Except as other wise provided in this Subsection, the *fire-resistance ratings* of floors and roofs shall conform to Table 9.10.8.1."
	[F03-OS1.2] [F04-OS1.2, OS1.3] Applies to portion of Code text: "Except as otherwise provided in this Subsection, the *fire-resistance ratings* of floors and roofs shall conform to Table 9.10.8.1."
9.10.8.2.	**Fire-Resistance Ratings in Sprinklered Buildings**
(1)	(a), (b) [F13-OP1.2] [F02, F82-OP1.3]
	(a), (b) [F13-OS1.2, OS1.5] [F02, F82-OS1.3]
9.10.8.3.	**Fire-Resistance Ratings for Walls, Columns and Arches**
(1)	[F04-OP1.2, OP1.3]
	[F04-OS1.2, OS1.3]
9.10.8.4.	**Reserved**
9.10.8.5.	**Service Rooms**
(1)	
9.10.8.6.	**Mezzanines**
(1)	
9.10.8.7.	**Roofs Supporting an Occupancy**

Acceptable Solution	Objectives and Functional Statements
(1)	[F03-OP1.2]
	[F03-OS1.2]
9.10.8.8.	**Floors of Exterior Passageways**
(1)	[F06-OP1.2] [F04-OP1.3]
	[F05-OS1.5] [F06-OS1.2, OS1.5]
(2)	
(3)	
9.10.8.9.	**Crawl Spaces**
(1)	
9.10.8.10.	**Application to Houses**
(1)	
9.10.8.11.	**Part 3 as an Alternative**
(1)	
9.10.9.1.	**Application**
(1)	
9.10.9.2.	**Continuous Barrier**
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	[F03-OP1.2]
	[F03-OS1.2]
9.10.9.3.	**Openings to be Protected With Closures**
(1)	[F03-OP1.2]
	[F03-OS1.2]
9.10.9.4.	**Floor Assemblies**
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	
(3)	
(4)	
9.10.9.5.	**Interconnected Floor Spaces**
(1)	
9.10.9.6.	**Service Equipment Penetrating a Fire Separation**
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	[F03-OP1.2] [F04-OP1.3] Applies to portion of Code text: “Except as provided in Sentence (3) to (9) and Article 9.10.9.7., pipes, ducts, electrical boxes, totally enclosed raceways or other similar service equipment that partly or wholly penetrate an assembly required to have a *fire-resistance rating* shall be *noncombustible* ...”
	[F03-OS1.2] [F04-OS1.3] Applies to portion of Code text: “Except as provided in Sentence (3) to (9) and Article 9.10.9.7., pipes, ducts, electrical boxes, totally enclosed raceways or other similar service equipment that partly or wholly penetrate an assembly required to have a *fire-resistance rating* shall be *noncombustible* ...”
(3)	
(4)	
(5)	
(6)	
(7)	
(8)	
(9)	
9.10.9.7.	**Combustible Piping**
(1)	[F03-OP1.2] [F04-OP1.3]
	[F03-OS1.2] [F04-OS1.3]
(2)	
(3)	

Acceptable Solution	Objectives and Functional Statements
(4)	
(5)	
(6)	
9.10.9.8.	**Collapse of Combustible Construction**
(1)	[F03-OP1.2]
	[F03-OS1.2]
9.10.9.9.	**Reduction in Thickness of Fire Separation by Beams and Joists**
(1)	[F03-OP1.2]
	[F03-OS1.2]
9.10.9.10.	**Concealed Spaces above Fire Separations**
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	[F03-OP1.2]
	[F03-OS1.2]
9.10.9.11.	**Separation of Residential Occupancies**
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	[F03-OP1.2]
	[F03-OS1.2]
(3)	[F03-OP1.2]
	[F03-OS1.2]
(4)	
9.10.9.12.	**Residential Suites, Live/Work Units and Industrial Buildings**
(1)	[F02-OS1.2]
(2)	[F02, F03-OS1.2]
9.10.9.13.	**Separation of Suites**
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	[F02-OP1.2]
	[F02-OS1.2]
9.10.9.14.	**Separation of Residential Suites**
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	
(3)	[F03-OS1.2]
9.10.9.15.	**Separation of Public Corridors**
(1)	[F03, F06-OP1.2]
	[F03, F05-OS1.5] [F06-OS1.2, OS1.5]
(2)	[F03-OS1.2] [F06, F05-OS1.5]
	[F03, F06-OP1.2]
(3)	[F03-OS1.2] [F05, F06-OS1.5]
	[F03, F06-OP1.2]
9.10.9.16.	**Separation of Storage Garages**
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	[F03-OP1.2]
	[F03-OS1.2]
(3)	
(4)	[F01-OS1.1]
	[F44-OS3.4]
(5)	[F01-OS1.1]

Acceptable Solution	Objectives and Functional Statements
	[F44-OS3.4]
9.10.9.17.	**Separation of Repair Garages**
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	
(3)	[F03-OP1.2]
	[F03-OS1.2]
(4)	[F44-OH1.1]
	[F44-OS1.1]
	[F44-OS3.4]
(5)	[F44-OH1.1]
	[F44-OS1.1]
	[F44-OS3.4]
9.10.9.18.	**Exhaust Ducts Serving More Than One Fire Compartment**
(1)	[F03-OS1.2]
(2)	[F03-OS1.2]
9.10.9.19.	**Central Vacuum Systems**
(1)	[F03-OS1.2]
9.10.10.1.	**Application**
(1)	
9.10.10.2.	**Service Room Floors**
(1)	
9.10.10.3.	**Separation of Service Rooms**
(1)	[F03-OP1.2] [F03, F81-OP1.4]
	[F03-OS1.2] [F03, F81-OS1.4]
(2)	
9.10.10.4.	**Appliances and Equipment to be Located in a Service Room**
(1)	[F03-OP1.2] [F03, F81-OP1.4]
	[F03-OS1.2] [F03, F81-OS1.4]
(2)	
9.10.10.5.	**Incinerators**
(1)	[F03-OP1.2] [F03, F81-OP1.4]
	[F03-OS1.2] [F03, F81-OS1.4]
(2)	[F01-OS1.1]
(3)	[F01-OP1.1]
	[F20-OP2.1] [F80-OP2.3]
	[F01-OS1.1]
	[F20-OS2.1] [F80-OS2.3]
	[F40, F61-OH1.1, OH1.3]
(4)	[F01, F02-OS1.2]
9.10.10.6.	**Storage Rooms**
(1)	[F03-OP1.2]
	[F03-OS1.2]
9.10.10.7.	**Emergency Power Installations**
(1)	[F03-OS1.2, OS1.4] [F06-OS1.2, OS1.5]
	[F03-OP1.2, OP1.4] [F06-OP1.2]
9.10.11.1.	**Required Firewalls**
(1)	[F03-OP1.2]
	[F03-OP3.1]
	[F03-OS1.2]
9.10.11.2.	**Firewalls Not Required**

Acceptable Solution	Objectives and Functional Statements
(1)	
(2)	[F03-OP3.1]
	[F03-OS1.2]
(3)	[F03-OP3.1]
	[F03-OS1.2]
9.10.11.3.	**Construction of Firewalls**
(1)	
9.10.11.4.	**Firewalls in Detached Garages**
(1)	[F03-OP1.2]
	[F03-OS1.2]
9.10.12.1.	**Termination of Floors or Mezzanines**
(1)	[F03-OP1.2, OP1.4]
	[F03-OS1.5]
(2)	
9.10.12.2	**Location of Skylights**
(1)	[F03-OP1.2]
	[F03-OS1.2]
9.10.12.3.	**Exterior Walls Meeting at an Angle**
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	[F03-OP1.2]
	[F03-OS1.2]
9.10.12.4.	**Protection of Soffits**
(1)	
(2)	[F03-OP1.2]
	[F03-OS1.2]
(3)	[F03-OP1.2]
	[F03-OS1.2]
(4)	
(5)	
9.10.13.1.	**Closures**
(1)	[F03-OP1.2]
	[F03-OS1.2]
9.10.13.2.	**Solid Core Wood Door as a Closure**
(1)	
(2)	[F03-OP1.2]
	[F03-OS1.2]
9.10.13.3.	**Unrated Wood Door Frames**
(1)	
9.10.13.4.	**Doors as a Means of Egress**
(1)	
9.10.13.5.	**Wired Glass as a Closure**
(1)	
(2)	[F03-OP1.2]
	[F03-OS1.2]
(3)	[F03-OP1.2]
	[F03-OS1.2]
9.10.13.6.	**Steel Door Frames**
(1)	[F03-OP1.2]
	[F03-OS1.2]
9.10.13.7.	**Glass Block as a Closure**

Acceptable Solution	Objectives and Functional Statements
(1)	
9.10.13.8.	**Maximum Size of Opening**
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	[F03-OP1.2]
	[F03-OS1.2]
9.10.13.9.	**Door Latch**
(1)	[F03-OP1.2]
	[F03-OS1.2]
9.10.13.10.	**Self-Closing Device**
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	
9.10.13.11.	**Hold-Open Devices**
(1)	
9.10.13.12.	**Service Room Doors**
(1)	[F10-OS1.5] Applies to portion of Code text: "... but shall swing outward from such rooms in all other cases."
	[F30-OS3.1] Applies to portion of Code text: "Swing-type doors shall open into *service rooms* containing fuel-fired equipment where such doors lead to *public corridors* or rooms used for assembly ..."
9.10.13.13.	**Fire Dampers**
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	
(3)	
(4)	
(5)	
9.10.13.14.	**Fire Stop Flaps**
(1)	[F03-OP1.3]
	[F03-OS1.3]
9.10.13.15.	**Doors Between Garages and Dwelling Units**
(1)	[F01-OS1.1]
	[F44-OS3.4]
(2)	[F01-OS1.1]
	[F44-OS3.4]
9.10.13.16.	**Door Stops**
(1)	[F81-OP1.4]
	[F81-OS1.4]
9.10.14.1.	**Application**
(1)	
9.10.14.2.	**Area and Location of Exposing Building Face**
(1)	
(2)	
(3)	
(4)	
(5)	
9.10.14.3.	**Inadequate Fire Fighting Facilities**
(1)	[F03-OP3.1]
9.10.14.4.	**Openings in Exposing Building Face**
(1)	[F03-OP3.1]
(2)	[F03-OP3.1]
(3)	[F03-OP3.1]

Acceptable Solution	Objectives and Functional Statements
(4)	[F03-OP3.1]
(5)	
(6)	
(7)	
9.10.14.5.	**Construction of Exposing Building Face and Walls above Exposing Building Face**
(1)	[F02, F03-OP3.1]
(2)	[F02, F03-OP3.1]
(3)	[F03-OP3.1]
(4)	
(5)	[F03-OP3.1]
(6)	
(7)	
9.10.14.6.	**Minor Openings in Exposing Building Face**
(1)	
9.10.15.1.	**Application**
(1)	
9.10.15.2.	**Area and Location of Exposing Building Face**
(1)	
(2)	
(3)	
(4)	
(5)	
9.10.15.3.	**Inadequate Firefighting Facilities**
(1)	[F03-OP3.1]
9.10.15.4.	**Glazed Openings in Exposing Building Face**
(1)	[F03-OP3.1]
(2)	
(3)	
(4)	[F03-OP3.1]
(5)	
9.10.15.5.	**Construction of Exposing Building Face of Houses**
(1)	[F02, F03-OP3.1]
(2)	[F02, F03-OP3.1]
(3)	[F02, F03-OP3.1]
(4)	
(5)	[F03-OP3.1]
(6)	
9.10.16.1.	**Required Fire Stops in Concealed Spaces**
(1)	[F03-OP1.2] [F03-OS1.2]
(2)	[F03-OP1.2] [F03-OS1.2]
(3)	[F03-OP1.2] [F03-OS1.2]
(4)	[F03-OP1.2] [F03-OS1.2]
(5)	[F02, F03-OP1.2] [F02, F03-OS1.2]
(6)	[F02, F03-OP1.2] [F02, F03-OS1.2]
9.10.16.2.	**Required Fire Stops in Wall Assemblies**

Acceptable Solution	Objectives and Functional Statements
(1)	[F03-OP1.2] [F03-OS1.2]
(2)	
(3)	
9.10.16.3.	**Fire Stop Materials**
(1)	[F03-OP1.2] [F03-OS1.2]
(2)	[F04-OP1.2] [F04-OS1.2]
9.10.16.4.	**Penetration of Fire Stops**
(1)	[F03-OP1.2] [F03-OS1.2]
9.10.17.1.	**Flame Spread Rating of Interior Surfaces**
(1)	[F02-OS1.2]
(2)	
(3)	
9.10.17.2.	**Ceilings in Exits or Public Corridors**
(1)	[F05-OS1.5]
9.10.17.3.	**Walls in Exits**
(1)	[F05-OS1.5]
(2)	[F05-OS1.5]
9.10.17.4.	**Exterior Exit Passageways**
(1)	[F05-OS1.5]
9.10.17.5.	**Walls in Public Corridors**
(1)	[F05-OS1.5]
9.10.17.6.	**Calculation of Wall and Ceiling Areas**
(1)	
9.10.17.7.	**Corridors Containing an Occupancy**
(1)	
9.10.17.8.	**Light Diffusers and Lenses**
(1)	
9.10.17.9.	**Combustible Skylights**
(1)	[F02F05-OS1.5]
9.10.17.10.	**Protection of Foamed Plastics**
(1)	(a), (b), (c) [F01, F02, F05-OS1.5]
(2)	[F01, F02-OS1.2]
9.10.17.11.	**Walls and Ceilings in Bathrooms**
(1)	
9.10.17.12.	**Coverings or Linings of Ducts**
(1)	
9.10.18.1.	**Access Provided through a Firewall**
(1)	[F11-OS1.5]
9.10.18.2.	**Fire Alarm System Required**
(1)	[F11-OS1.5]
(2)	
9.10.18.3.	**Rooms and Spaces Requiring Heat Detectors or Smoke Detectors**
(1)	[F11-OS1.5]
(2)	[F11-OS1.5]
(3)	[F02-OS1.2] Applies to *sprinklered buildings* [F11-OS1.5] Applies to the supervision of the system and flow alarm
(4)	[F11-OS1.5]

Acceptable Solution	Objectives and Functional Statements
9.10.18.4.	**Smoke Detectors in Recirculating Air Handling Systems**
(1)	[F03-OS1.2]
9.10.18.5.	**Portions of Buildings Considered as Separate Buildings**
(1)	[F03-OS1.2]
(2)	[F11-OS1.2]
9.10.18.6.	**Design and Installation Requirements**
(1)	
9.10.18.7.	**Reserved**
9.10.18.8.	**Open-Air Storage Garages**
(1)	
9.10.18.9.	**Fire Alarm System in a Hotel**
(1)	[F11-OS1.5]
9.10.19.1.	**Required Smoke Alarms**
(1)	[F11, F81-OS1.5]
9.10.19.2.	**Location of Smoke Alarms**
(1)	[F11-OS1.5]
(2)	[F11-OS1.5]
(3)	[F11-OS1.5]
(4)	[F11, F81-OS1.4, OS1.5]
9.10.19.3.	**Power Supply**
(1)	[F81-OS1.5]
(2)	
9.10.19.4.	**Interconnection of Smoke Alarms**
(1)	[F11-OS1.5]
9.10.19.5.	**Instructions for Maintenance and Care**
(1)	[F82-OS1.5]
9.10.19.6.	**Silencing of Alarm Noise**
(1)	
9.10.20.1.	**Windows or Access Panels Required**
(1)	[F12-OP1.2]
	[F12-OS1.2, OS1.5]
(2)	[F12-OP1.2] Applies to portion of Code text: "Access required in Sentence (1) ... provides an opening not less than 1 100 mm high or 550 mm wide, the sill height shall not be more than 900 mm above the floor."
	[F12-OS1.2, OS1.5] Applies to portion of Code text: "Access required in Sentence (1) ... provides an opening not less than 1 100 mm high and 550 mm wide, the sill height of which shall not be more than 900 mm above the floor."
(3)	
9.10.20.2.	**Access to Basements**
(1)	[F12-OP1.2]
	[F12-OS1.2, OS1.5]
(2)	[F12-OP1.2] Applies to portion of Code text: "Access required in Sentence (1) ... provides an opening not less than 1 100 mm high and 550 mm wide, the sill of which shall not be more than 900 mm above the floor."
	[F12-OS1.2, OS1.5] Applies to portion of Code text: "Access required in Sentence (1) ... provides an opening not less than 1 100 mm high and 550 mm wide, the sill of which shall not be more than 900 mm above the floor."
(3)	
9.10.20.3.	**Fire Department Access to Buildings**
(1)	[F12-OP1.2]
	[F12-OS1.2, OS1.5]
(2)	[F12-OP1.2]
	[F12-OS1.2, OS1.5]
9.10.20.4.	**Portable Extinguishers**

Acceptable Solution	Objectives and Functional Statements
(1)	[F02, F12, F81-OP1.2]
	[F81, F02, F12-OS1.2]
9.10.20.5.	**Freeze Protection for Fire Protection Systems**
(1)	[F02, F81-OP1.2]
	[F02, F81-OS1.2]
9.10.21.1	**Requirements for Construction Camps**
(1)	
9.10.21.2.	**Separation of Sleeping Rooms**
(1)	[F03-OP1.2]
	[F03-OS1.2]
9.10.21.3.	**Floor Assemblies Between the First and Second Storey**
(1)	[F03-OP1.2]
	[F03-OS1.2, OS1.5]
9.10.21.4.	**Walkways Connecting Buildings**
(1)	[F03-OP1.2]
	[F03-OP3.1]
	[F03, F06-OS1.2, OS1.5]
9.10.21.5.	**Spatial Separations**
(1)	[F03-OP3.1]
9.10.21.6.	**Flame Spread Ratings**
(1)	[F05-OS1.2, OS1.5]
(2)	
9.10.21.7.	**Smoke Detectors**
(1)	[F11-OS1.5]
9.10.21.8.	**Portable Fire Extinguishers**
(1)	[F02, F12, F81-OP1.2]
	[F02, F12, F81-OS1.2]
9.10.21.9.	**Hose Stations**
(1)	[F02, F12, F81-OP1.2]
	[F02, F12, F81-OS1.2]
(2)	[F12-OP1.2]
	[F12-OS1.2]
(3)	[F12-OP1.2]
	[F12-OS1.2]
9.10.22.1.	**Installation of Ranges**
(1)	
(2)	
9.10.22.2.	**Vertical Clearances above Ranges**
(1)	
(2)	[F01-OS1.1, OS1.2]
9.10.22.3.	**Protection Around Ranges**
(1)	[F01-OS1.1, OS1.2]
(2)	
(3)	[F01-OS1.1, OS1.2]
9.11.1.1.	**Determination of Sound Transmission Class Rating**
(1)	[F56-OH3.1]
9.11.2.1.	**Minimum Sound Transmission Class Rating**
(1)	[F56-OH3.1]
(2)	[F56-OH3.1]
9.11.2.2.	**Building Services in an Assembly**
(1)	[F56-OH3.1]

Acceptable Solution	Objectives and Functional Statements
9.12.1.1.	**Removal of Topsoil and Organic Matter**
(1)	[F20, F40, F41-OH1.1]
(2)	[F81-OP2.3, OP2.4]
	[F81-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F81-OS1.2] Applies to assemblies required to provide fire resistance.
	[F81-OS2.3]
	[F81-OS3.1] Applies to floors and elements that support floors.
(3)	[F20-OP2.2] [F20, F21-OP2.3, OP2.4]
	[F20-OS2.2, OS2.3] [F21-OS2.3]
	[F20, F21-OS3.1] Applies to floors and elements that support floors.
	[F20, F21, F40, F41-OH1.1] [F20, F21-OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F21-OH4] Applies to floors and elements that support floors.
9.12.1.2.	**Standing Water**
(1)	[F60-OP2.2, OP2.3, OP2.4]
	[F60-OS2.2, OS2.3]
	[F60-OS3.1] Applies to floors and elements that support floors.
	[F60-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F60-OH4] Applies to floors and elements that support floors.
9.12.1.3.	**Protection from Freezing**
(1)	[F21-OP2.3, OP2.4]
	[F21-OS2.3]
	[F21-OS3.1] Applies to floors and elements that support floors.
	[F21-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F21-OH4] Applies to floors and elements that support floors.
9.12.1.4.	**Precautions During Excavation**
(1)	[F20-OP2.3]
	[F20, F21, F22, F62, F80-OP4.1]
	[F20, F22, F80-OS2.6]
(2)	[F20-OP2.3]
	[F20, F21, F80-OP4.1]
	[F20, F80-OS2.6]
9.12.2.1.	**Excavation to Undisturbed Soil**
(1)	[F20-OP2.2, OP2.3, OP2.4]
	[F20-OS2.2, OS2.3]
	[F20-OS3.1] Applies to floors and elements that support floors.
	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
9.12.2.2.	**Minimum Depth of Foundations**
(1)	[F21-OP2.3, OP2.4]
	[F21-OS2.3]
	[F21-OS3.1] Applies to floors, elements that support floors, and concrete steps with more than 2 risers.
	[F21-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F21-OH4] Applies to floors and elements that support floors.
(2)	
(3)	
(4)	
(5)	
(6)	
(7)	
9.12.3.1.	**Placement of Backfill**

Acceptable Solution	Objectives and Functional Statements
(1)	[F81-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F81-OP2.1] [F22-OP2.4] [F81-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F81-OS2.1] [F81-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.12.3.2.	**Grading of Backfill**
(1)	[F60, F61-OH1.1, OH1.2, OH1.3]
	[F60, F61-OP2.3]
	[F60, F61-OS2.3]
9.12.3.3.	**Deleterious Debris and Boulders**
(1)	[F81-OH1.1, OH1.2, OH1.3]
	[F81-OP2.3]
	[F81-OS2.3]
	[F81-OS3.1] Applies to floors and elements that support floors.
(2)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OP2.1, OP2.3]
	[F20-OS2.1, OS2.3]
	[F20-OS3.1] Applies to floors and elements that support floors.
(3)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OP2.1, OP2.3]
	[F20-OS2.1, OS2.3]
	[F20-OS3.1] Applies to floors and elements that support floors.
9.12.3.4.	**Lateral Support of Foundation Wall**
(1)	[F20, F22-OP2.1]
	[F20, F22-OS2.1]
9.12.4.1.	**Compacting or Filling With Concrete**
(1)	[F21-OH1.1, OH1.2, OH1.3]
	[F21-OH2.1] Applies to sewer-line locations beneath footings.
	[F21-OP2.2] [F21-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F21-OS2.1] [F21-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F21-OS3.1] Applies to floors and elements that support floors.
9.13.1.1.	**Application**
(1)	
9.13.2.1.	**Dampproofing**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(2)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(3)	
(4)	
9.13.2.2.	**Material Standards**
(1)	[F61-OS2.3]
	[F40-OH1.1] Applies to materials installed to control the ingress of soil gas. [F61-OH1.1, OH1.2, OH1.3] Applies to materials installed to control the ingress of moisture.
9.13.2.3.	**Standards for Application**

Acceptable Solution	Objectives and Functional Statements
(1)	[F61-OS2.3]
	[F40-OH1.1] Applies to materials installed to control the ingress of soil gas. [F61-OH1.1, OH1.2, OH1.3] Applies to materials installed to control the ingress of moisture.
9.13.2.4.	**Preparation of Surface**
(1)	[F61-OS2.3]
	[F40-OH1.1] Applies to dampproofing installed to control the ingress of soil gas. [F61-OH1.1, OH1.2, OH1.3] Applies to dampproofing installed to control the ingress of moisture.
(2)	[F61-OS2.3]
	[F40-OH1.1] Applies to *foundation* walls where the dampproofing serves to control the ingress of soil gas. [F61-OH1.1, OH1.2, OH1.3] Applies where the dampproofing serves to control the ingress of moisture.
(3)	[F61-OS2.3]
	[F61-OH1.1, OH1.2, OH1.3] [F40-OH1.1] Applies where dampproofing materials are installed to control the infiltration of soil gas.
9.13.2.5.	**Application of Dampproofing Material**
(1)	[F61-OS2.3]
	[F40-OH1.1] Applies to dampproofing installed to control the ingress of soil gas. [F61-OH1.1, OH1.2, OH1.3] Applies to dampproofing installed to control the ingress of moisture.
9.13.2.6.	**Interior Dampproofing of Walls**
(1)	[F61-OH1.1, OH1.2]
	[F61-OS2.3]
(2)	
(3)	[F61-OH1.1, OH1.2]
	[F61-OS2.3]
9.13.2.7.	**Dampproofing of Floors-on-Ground**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(2)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(3)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(4)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.13.2.8.	**Dampproofing of Preserved Wood Foundation Walls**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.13.3.1.	**Required Waterproofing**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(2)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.13.3.2.	**Material Standards**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.13.3.3	**Standards for Application**
(1)	[F61-OS2.3]
	[F61-OH1.1, OH1.2, OH1.3] [F40-OH1] Applies where waterproofing materials are installed to control the infiltration of soil gas.
9.13.3.4.	**Preparation of Surface**
(1)	[F61-OS2.3]
	[F61-OH1.1, OH1.2, OH1.3] [F40-OH1] Applies where waterproofing materials are installed to control the infiltration of soil gas.
(2)	[F61-OS2.3]

Acceptable Solution	Objectives and Functional Statements
	[F61-OH1.1, OH1.2, OH1.3] [F40-OH1] Applies where waterproofing materials are installed to control the infiltration of soil gas
(3)	[F61-OS2.3]
	[F61-OH1.1, OH1.2, OH1.3] [F40-OH1.1] Applies where waterproofing materials are installed to control the infiltration of soil gas
9.13.3.5.	**Application of Waterproofing Membranes**
(1)	[F61-OS2.3]
	[F61-OH1.1, OH1.2, OH1.3] [F40-OH1] Applies where waterproofing materials are installed to control the infiltration of soil gas
9.13.3.6.	**Floor Waterproofing System**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.13.4.1.	**Soil Gas Control**
(1)	[F40-OH1.1]
9.13.4.2.	**Required Soil Gas Control**
(1)	[F40-OH1.1]
(2)	
(3)	[F40-OH1.1]
(4)	[F40-OH1.1]
9.13.4.3.	**Material Standards**
(1)	[F40-OH1.1]
9.14.1.1.	**Application**
(1)	
9.14.1.2.	**Crawl Spaces**
(1)	
9.14.1.3.	**Floors-on-Ground**
(1)	
9.14.2.1.	**Foundation Wall Drainage**
(1)	[F60-OH1.1, OH1.2, OH1.3]
	[F60-OP2.1, OP2.2, OP2.3]
	[F60-OS2.1, OS2.2, OS2.3]
(2)	[F60-OH1.1, OH1.2, OH1.3]
(3)	(a) [F60-OH1.1, OH1.2, OH1.3] Applies where *foundations* serve as or support an environmental separator
	(a) [F60-OS2.1] (a) [F60-OS2.3] Applies where *foundations* serve as or support an environmental separator
	(b) [F21-OH1.1, OH1.2, OH1.3] Applies where *foundations* serve as or support an environmental separator
	(b) [F21-OH4.1] Applies where *foundations* support floors or elements supporting floors
	(b) [F21-OP2.1] (b) [F21-OP2.3] Applies where *foundations* serve as or support an environmental separator (b) [F21-OP2.4] Applies where *foundations* support walls or floors
	(b) [F21-OS2.1] (b) [F21-OS2.3] Applies where *foundations* serve as or support an environmental separator
	(b) [F21-OS3.1] Applies where *foundations* support floors or elements supporting floors (b) [F21-OS3.7] Applies where *foundations* support walls that contain windows or doors required for emergency egress
(4)	[F60-OH1.1, OH1.2, OH1.3]
(5)	
(6)	
(7)	
9.14.3.1.	**Material Standards**
(1)	[F60-OH1.1, OH1.2, OH1.3]
	[F60-OP2.1, OP2.3]

Acceptable Solution	Objectives and Functional Statements
	[F60-OS2.1, OS2.3]
9.14.3.2.	**Minimum Size**
(1)	[F60-OH1.1, OH1.2, OH1.3]
	[F60-OP2.1, OP2.2, OP2.3]
	[F60-OS2.1, OS2.2, OS2.3]
9.14.3.3.	**Installation**
(1)	[F60-OH1.1, OH1.2, OH1.3]
	[F60-OP2.1, OP2.2, OP2.3]
	[F60-OS2.1, OS2.2, OS2.3]
(2)	[F60-OH1.1, OH1.2, OH1.3]
	[F60-OP2.1, OP2.2, OP2.3]
	[F60-OS2.1, OS2.2, OS2.3]
(3)	[F60-OH1.1, OH1.2, OH1.3]
	[F60-OP2.1, OP2.2, OP2.3]
	[F60-OS2.1, OS2.2, OS2.3]
(4)	[F60-OH1.1, OH1.2, OH1.3]
	[F60-OP2.1, OP2.2, OP2.3]
	[F60-OS2.1, OS2.2, OS2.3]
9.14.4.1.	**Type of Granular Material**
(1)	(a) [F60-OH1.1, OH1.2, OH1.3]
	(a) [F60-OP2.3] [F21-OP2.6]
	(a) [F21-OS2.2] [F60-OS2.3]
	(b) [F21-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	(b) [F21-OH4] Applies to floors and elements that support floors.
	(b) [F21-OP2.1, OP2.4] (b) [F21-OP2.3] Applies to elements that support or are part of an environmental separator.
	(b) [F21-OS2.1] (b) [F21-OS2.3] Applies to elements that support or are part of an environmental separator.
	(b) [F21-OS3.1] Applies to floors and elements that support floors.
9.14.4.2.	**Installation**
(1)	[F60-OH1.1, OH1.2, OH1.3]
	[F60-OP2.1, OP2.2, OP2.3]
	[F60-OS2.1, OS2.2, OS2.3]
9.14.4.3.	**Grading**
(1)	[F60-OH1.1, OH1.2, OH1.3]
	[F60-OP2.1, OP2.2, OP2.3]
	[F60-OS2.1, OS2.2, OS2.3]
9.14.4.4.	**Wet Site Conditions**
(1)	[F60-OH1.1, OH1.2, OH1.3]
	[F60-OP2.1, OP2.2, OP2.3]
	[F60-OS2.1, OS2.2, OS2.3]
9.14.5.1.	**Drainage Disposal**
(1)	[F60-OH1.1, OH1.2, OH1.3]
	[F60-OP2.1, OP2.2, OP2.3]
	[F60-OS2.1, OS2.2, OS2.3]
9.14.5.2.	**Sump Pits**
(1)	[F60-OH1.1, OH1.2, OH1.3]
	[F60-OP2.1, OP2.2, OP2.3]
	[F60-OS2.1, OS2.2, OS2.3]
(2)	[F30-OS3.1]
9.14.5.3.	**Dry Wells**

Acceptable Solution	Objectives and Functional Statements
(1)	[F60-OH1.1, OH1.2, OH1.3]
	[F60-OP2.1, OP2.2, OP2.3]
	[F60-OS2.1, OS2.2, OS2.3]
(2)	[F60-OH1.1, OH1.2, OH1.3]
	[F60-OP2.1, OP2.2, OP2.3]
	[F60-OS2.1, OS2.2, OS2.3]
9.14.6.1.	**Surface Drainage**
(1)	[F60-OH1.1, OH1.2, OH1.3]
	[F60-OP2.1, OP2.2, OP2.3]
	[F60-OS2.1, OS2.2, OS2.3]
9.14.6.2.	**Drainage away from Wells or Septic Disposal Beds**
(1)	[F46-OH2.2] Applies to directing drainage away from the location of a water supply. [F44-OH2.1] Applies to directing drainage away from a septic tank disposal system.
9.14.6.3.	**Window Wells**
(1)	[F60-OH1.1, OH1.2, OH1.3]
	[F60-OP2.1, OP2.3]
	[F60-OS2.1, OS2.3]
9.14.6.4.	**Catch Basin**
(1)	[F60-OH1.1, OH1.2, OH1.3]
	[F61-OP2.3]
	[F61-OS2.3]
	[F61-OS3.1]
9.14.6.5.	**Downspouts**
(1)	
9.15.1.1.	**General**
(1)	
(2)	
(3)	
(4)	
9.15.1.2.	**Permafrost**
(1)	
9.15.1.3.	**Foundations for Deformation Resistant Buildings**
(1)	[F20-OP2.2] [F22-OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20-OS2.2] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.15.2.1.	**Concrete**
(1)	
9.15.2.2.	**Unit Masonry Construction**
(1)	[F20-OP2.1] [F21, F61-OP2.4] [F20, F21, F61-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F21, F61-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F21, F61-OH4] Applies to floors and elements that support floors.

Acceptable Solution	Objectives and Functional Statements
	[F20-OS2.1] [F20, F21, F61-OS2.3] Applies to elements that support or are part of an environmental separator
	[F20, F21, F61-OS3.1] Applies to floors and elements that support floors
(2)	
(3)	(a) [F20-OP2.1] (a) [F80-OP2.4] (a) [F20, F80-OP2.3] Applies to elements that support or are part of an environmental separator
	(a) [F20, F80-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator
	(a) [F20, F80-OH4] Applies to floors and elements that support floors
	(a) [F20-OS2.1] (a) [F20, F80-OS2.3] Applies to elements that support or are part of an environmental separator
	(a) [F20, F80-OS3.1] Applies to floors and elements that support floors
	(b) [F20-OP2.1] (b) [F20-OP2.4] (b) [F20, F80-OP2.3] Applies to elements that support or are part of an environmental separator
	(b) [F20, F80-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator
	(b) [F20, F80-OH4] Applies to floors and elements that support floors
	(b) [F20-OS2.1] (b) [F20, F80-OS2.3] Applies to elements that support or are part of an environmental separator
	(b) [F20, F80-OS3.1] Applies to floors and elements that support floors
	(c) [F20-OP2.1] (c) [F61-OP2.4] (c) [F20, F61-OP2.3] Applies to elements that support or are part of an environmental separator
	(c) [F20, F61-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator
	(c) [F20, F61-OH4] Applies to floors and elements that support floors
	(c) [F20-OS2.1] (c) [F20, F61-OS2.3] Applies to elements that support or are part of an environmental separator
	(c) [F20, F61-OS3.1] Applies to floors and elements that support floors
9.15.2.3.	**Pier Type Foundations**
(1)	[F20-OP2.1, OP2.2] [F22-OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator
	[F20, F22-OH4] Applies to floors and elements that support floors
	[F20-OS2.1, OS2.2] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator
	[F20, F22-OS3.1] Applies to floors and elements that support floors
(2)	[F20-OP2.1, OP2.2] [F22-OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator
	[F20, F22-OH4] Applies to floors and elements that support floors
	[F20-OS2.1, OS2.2] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator
	[F20, F22-OS3.1] Applies to floors and elements that support floors
(3)	[F20-OP2.1, OP2.4, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator
	[F20, F22-OH4] Applies to floors and elements that support floors

Acceptable Solution	Objectives and Functional Statements
	[F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator
	[F20, F22-OS3.1] Applies to floors and elements that support floors
(4)	[F20-OP2.1, OP2.4] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors
	[F20-OS2.1, OS2.4] [F22-OS2.4, OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator
	[F20, F22-OS3.1] Applies to floors and elements that support floors
9.15.2.4.	**Wood Frame Foundations**
(1)	(a) [F20-OP2.1, OP2.2] (a) [F20, F80-OP2.3] Applies to elements support or are part of an environmental separator
	(a) [F20, F80-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	(a) [F20, F80-OH4] Applies to floors and elements that support floors
	(a) [F20-OS2.1, OS2.2] (a) [F20, F80-OS2.3] Applies to elements that support or are part of an environmental separator
	(a) [F20, F80-OS3.1] Applies to floors and elements that support floors
9.15.3.1.	**Footings Required**
(1)	[F20-OP2.2] [F20, F21-OP2.4] [F20, F21-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F21-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F21-OH4] Applies to floors and elements that support floors
	[F20-OS2.2] [F20, F21-OS2.3] Applies to elements that support or are part of an environmental separator
	[F20, F21-OS3.1] Applies to floors and elements that support floors
9.15.3.2.	**Support of Footings**
(1)	[F21-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F21-OH4] Applies to floors and elements that support floors
	[F21-OP2.4] [F21-OP2.3] Applies to elements that support or are part of an environmental separator
	[F21-OS2.4] [F21-OS2.3] Applies to elements that support or are part of an environmental separator
	[F21-OS3.1] Applies to floors and elements that support floors
(2)	[F21-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F21-OH4] Applies to floors and elements that support floors
	[F21-OP2.1, OP2.4] [F21-OP2.3] Applies to elements that support or are part of an environmental separator
	[F21-OS2.1] [F21-OS2.3] Applies to elements that support or are part of an environmental separator
	[F21-OS3.1] Applies to floors and elements that support floors
9.15.3.3.	**Application of Footing Width and Area Requirements**
(1)	
(2)	
(3)	
9.15.3.4.	**Basic Footing Widths and Areas**

Acceptable Solution	Objectives and Functional Statements
(1)	[F20-OP2.1] [F21-OP2.4] [F20, F21-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F21-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F21-OH4] Applies to floors and elements that support floors.
	[F20-OS2.2] [F20, F21-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F21-OS3.1] Applies to floors and elements that support floors.
(2)	[F20-OP2.2] [F21-OP2.4] [F20, F21-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F21-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F21-OH4] Applies to floors and elements that support floors.
	[F20-OS2.2] [F20, F21-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F21-OS3.1] Applies to floors and elements that support floors.
(3)	[F20-OP2.2] [F21-OP2.4] [F20, F21-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F21-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F21-OH4] Applies to floors and elements that support floors.
	[F20-OS2.2] [F20, F21-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F21-OS3.1] Applies to floors and elements that support floors.
9.15.3.5.	**Adjustments to Footing Widths for Exterior Walls**
(1)	[F20-OP2.2, OP2.3] [F21-OP2.3, OP2.4]
	[F20-OS2.2, OS2.3] [F21-OS2.3]
	[F20, F21-OH1.1, OH1.2, OH1.3]
	[F20, F21-OH4] Applies to floors and elements that support floors.
	[F20, F21-OS3.1] Applies to floors and elements that support floors.
9.15.3.6.	**Adjustments to Footing Widths for Interior Walls**
(1)	[F20-OP2.2] [F21-OP2.4] [F20, F21-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F21-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F21-OH4] Applies to floors and elements that support floors.
	[F20-OS2.2] [F20, F21-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F21-OS3.1] Applies to floors and elements that support floors.
(2)	[F20-OP2.2]
	[F10-OS2.2]
9.15.3.7.	**Adjustments to Footing Area for Columns**
(1)	[F20-OP2.2] [F21-OP2.4] [F20, F21-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F21-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F21-OH4] Applies to floors and elements that support floors.
	[F20-OS2.2] [F20, F21-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F21-OS3.1] Applies to floors and elements that support floors.
9.15.3.8.	**Footing Thickness**

Acceptable Solution	Objectives and Functional Statements
(1)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
9.15.3.9.	**Step Footings**
(1)	[F20, F22-OP2.3, OP2.4]
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies where the *foundation* supports or is part of an environmental separator.
	[F20, F22-OH4] Applies to *foundations* that support floors.
	[F20, F22-OS2.3, OS2.4]
	[F20, F22-OS3.1] Applies to *foundations* that support floors.
9.15.4.1.	**Permanent Form Material**
(1)	[F22, F55, F63-OH1.1, OH1.2, OH1.3]
9.15.4.2.	**Foundation Wall Thickness and Required Lateral Support**
(1)	[F20-OP2.1, OP2.3] [F22-OP2.3, OP2.4]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20-OS2.1, OS2.3] [F22-OS2.3]
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
(2)	[F20-OP2.1, OP2.3] [F22-OP2.3, OP2.4]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20-OS2.1, OS2.3] [F22-OS2.3]
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
(3)	[F20-OP2.1, OP2.3] [F22-OP2.3, OP2.4]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20-OS2.1, OS2.3] [F22-OS2.3, OS2.4]
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
(4)	[F20-OP2.1, OP2.3] [F22-OP2.3, OP2.4]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20-OS2.1, OS2.3] [F22-OS2.3]
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
(5)	[F20-OP2.1, OP2.3] [F22-OP2.3, OP2.4]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20-OS2.1, OS2.3] [F22-OS3.2, OS2.4]
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
(6)	
(7)	[F20-OP2.1, OP2.3] [F22-OP2.3, OP2.4]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20-OS2.1, OS2.3] [F22-OS2.3, OS2.4]
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
(8)	[F20-OP2.1, OP2.3] [F22-OP2.3, OP2.4]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OH4] Applies to floors and elements that support floors.

Acceptable Solution	Objectives and Functional Statements
	[F20-OS2.1, OS2.3] [F22-OS2.3, OS2.4]
	[F20, F22-OS3.1] Applies to floors and elements that support floors
(9)	[F20-OP2.1, OP2.3] [F22-OP2.3, OP2.4]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OH4] Applies to floors and elements that support floors
	[F20-OS2.1, OS2.3] [F22-OS2.3, OS2.4]
	[F20, F22-OS3.1] Applies to floors and elements that support floors
(10)	[F20-OP2.1, OP2.3] [F22-OP2.3, OP2.4]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OH4] Applies to floors and elements that support floors
	[F20-OS2.1, OS2.3] [F22-OS2.3, OS2.4]
	[F20, F22-OS3.1] Applies to floor and elements that support floors
9.15.4.3.	**Foundation Walls Considered to be Laterally Supported at the Top**
(1)	
(2)	
(3)	
(4)	
(5)	
9.15.4.4.	**Foundation Walls Considered to be Laterally Supported at the Bottom**
(1)	
9.15.4.5.	**Reinforcement for Flat Insulating Concrete Form Foundation**
(1)	[F20-OP2.1, OP2.3] [F22-OP2.3, OP2.4]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OH4] Applies to floors and elements that support floors
	[F20-OS2.1, OS2.3] [F22-OS2.3, OS2.4]
	[F20, F22-OS3.1] Applies to floors and elements that support floors
(2)	[F20-OP2.1, OP2.3] [F22-OP2.3, OP2.4]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OH4] Applies to floors and elements that support floors
	[F20-OS2.1, OS2.3] [F22-OS2.3, OS2.4]
	[F20, F22-OS3.1] Applies to floors and elements that support floors
(3)	[F20-OP2.1, OP2.3] [F22-OP2.3, OP2.4]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OH4] Applies to floors and elements that support floors
	[F20-OS2.1, OS2.3] [F22-OS2.3, OS2.4]
	[F20, F22-OS3.1] Applies to floors and elements that support floors
(4)	[F20-OP2.1, OP2.3] [F22-OP2.3, OP2.4]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OH4] Applies to floors and elements that support floors
	[F20-OS2.1, OS2.3] [F22-OS2.3, OS2.4]
	[F20, F22-OS3.1] Applies to floors and elements that support floors
9.15.4.6.	**Extension above Ground Level**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OP2.3]
	[F61-OS2.3]
9.15.4.7.	**Reduction in Thickness**
(1)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator
	[F20-OH4] Applies to floors and elements that support floors
	[F20-OP2.1, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator

Acceptable Solution	Objectives and Functional Statements
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator
	[F20-OS3.1] Applies to floors and elements that support floors
(2)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of environmental separator
	[F20-OH4] Applies to floors and elements that support floors
	[F20-OP2.1, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator
	[F20-OS3.1] Applies to floors and elements that support floors
(3)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator
	[F20-OH4] Applies to floors and elements that support floors
	[F20-OP2.1, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator
	[F20-OS3.1] Applies to floors and elements that support floors
9.15.4.8.	**Corbelling**
(1)	
9.15.4.9.	**Crack Control Joints**
(1)	[F21-OP2.3]
	[F21-OS2.3]
	[F21-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator
(2)	[F20-OP2.1] [F20, F61-OP2.3] Applies to elements that support or are part of an environmental separator
	[F20-OS2.1] [F20, F61-OS2.3] Applies to elements that support or are part of an environmental separator
	[F61-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator
9.15.4.10.	**Interior Masonry Walls**
(1)	
9.15.5.1.	**Support of Floor Joists**
(1)	[F20-OP2.1, OP2.4] [F20-OP2.3] [F40, F61-OP2.3, OP2.4] Applies to elements that support or are part of an environmental separator
	[F20, F40, F61-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator
	[F20, F40, F61-OH4] Applies to floors and elements that support floors
	[F20-OS2.1] [F40, F61-OS2.3] Applies to elements that support or are part of an environmental separator
	[F20, F40, F61-OS3.1] Applies to floors and elements that support floors
(2)	
9.15.5.2.	**Support of Beams**
(1)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator
	[F20-OH4] Applies to floors and elements that support floors
	[F20-OP2.1, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator
	[F20-OS3.1] Applies to floors and elements that support floors
(2)	[F80-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator
	[F80-OH4] Applies to floors and elements that support floors

Acceptable Solution	Objectives and Functional Statements
	[F80-OP2.3, OP2.4] Applies to elements that support or are part of an environmental separator.
	[F80-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F80-OS3.1] Applies to floors and elements that support floors.
9.15.5.3.	**Pilasters**
(1)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
(2)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
(3)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
9.15.6.1.	**Foundation Walls Below Ground**
(1)	
9.15.6.2.	**Foundation Walls Above Ground**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OP2.3]
	[F61-OS2.3]
9.15.6.3.	**Form Ties**
(1)	[F61-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F61-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F61-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F30-OS3.1]
9.16.1.1.	**Application**
(1)	
9.16.1.2.	**Structural Floor Slabs**
(1)	
9.16.1.3.	**Required Floors-on-Ground**
(1)	(a), (b) [F30-OS3.1]
	(a), (b) [F40-OH2.4]
9.16.1.4.	**Dampproofing and Waterproofing**
(1)	
9.16.2.1.	**Required Installation of Granular Fill**
(1)	[F40, F61-OH1.1] [F61, F60-OH1.2, OH1.3]
	[F60-OS2.3]
(2)	
9.16.2.2.	**Support of Floors**
(1)	[F21-OH1.1, OH1.2, OH1.3]

Acceptable Solution	Objectives and Functional Statements
	[F21-OP2.1, OP2.3, OP2.4]
	[F21-OS2.1, OS2.3]
	[F21-OS3.1]
(2)	[F21-OH1.1, OH1.2, OH1.3]
	[F21-OP2.1, OP2.3, OP2.4]
	[F21-OS2.1, OS2.3]
	[F21-OS3.1]
(3)	[F22-OS3.1]
(4)	
9.16.3.1.	**Control of Water Ingress**
(1)	[F60-OH1.1, OH1.2, OH1.3]
	[F60-OS2.3]
	[F60-OS3.1]
9.16.3.2.	**Hydrostatic Pressure**
(1)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OP2.1] [F61-OP2.6]
	[F20-OS2.1] [F61-OS2.3]
	[F20-OS3.1]
9.16.3.3.	**Floor Drains**
(1)	[F62-OH1.1, OH1.2, OH1.3]
	[F62-OS2.3]
	[F62-OS3.1]
9.16.4.1.	**Surface Finish**
(1)	[F30, F80-OS3.1]
	[F40-OH2.4]
	[F62-OH1.1, OH1.2, OH1.3]
(2)	[F20, F80-OS3.1]
	[F41-OH1.1]
9.16.4.2.	**Topping Course**
(1)	[F20, F80-OS3.1]
(2)	[F20, F80-OS3.1]
9.16.4.3.	**Thickness**
(1)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OH4]
	[F20-OP2.1, OP2.3]
	[F20-OS2.1, OS2.3]
	[F20-OS3.1]
9.16.4.4.	**Bond Break**
(1)	[F21-OS3.1]
9.16.4.5.	**Compressive Strength**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(2)	[F20, F80-OS2.1, OS2.3]
	[F20, F80-OP2.3]
9.16.5.1.	**Wood Frame Floors**
(1)	[F20-OH1.1, OH1.2, OH1.3] Applies where wood-frame floors-on-ground serve as an environmental separator
	[F20-OH4]
	[F20-OP2.1] [F20-OP2.3] Applies where wood-frame floors-on-ground serve as an environmental separator
	[F20-OS2.1] [F20-OS2.3] Applies where wood-frame floors-on-ground serve as an environmental separator

Acceptable Solution	Objectives and Functional Statements
	[F20-OS3.1]
9.17.1.1.	**Application**
(1)	
(2)	
9.17.2.1.	**Location**
(1)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.2, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.2] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
9.17.2.2.	**Lateral Support**
(1)	[F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F22-OP2.4, OP2.5] [F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS2.4, OS2.5] [F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	[F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F22-OP2.4, OP2.5] [F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS2.4, OS2.5] [F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(3)	
9.17.3.1.	**Size and Thickness**
(1)	[F20-OP2.1] [F20, F22-OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20-OS2.1] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
(2)	[F20-OP2.1] [F20, F22-OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20-OS2.1] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
9.17.3.2.	**End Bearing Plates**

Acceptable Solution	Objectives and Functional Statements
(1)	[F20-OP2.1] [F20, F22-OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20-OS2.1] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
(2)	
9.17.3.3.	**Paint**
(1)	[F80-OH1.1, OH1.2, OH1.3]
	[F80-OP2.3, OP2.4]
	[F80-OH4] Applies to floors and elements that support floors.
	[F80-OS2.3]
	[F80-OS3.1] Applies to floors and elements that support floors.
9.17.3.4.	**Design of Adjustable Steel Columns**
(1)	[F20-OP2.1] [F22-OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20-OS2.1] [F22-OS2.4] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors. [F20, F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	
9.17.4.1.	**Column Sizes**
(1)	[F20-OP2.1] [F20, F22-OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20-OS2.1] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
(2)	[F20-OP2.1] [F20, F22-OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20-OS2.1] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
9.17.4.2.	**Materials**
(1)	[F20-OP2.1] [F20, F22-OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.

Acceptable Solution	Objectives and Functional Statements
	[F20-OS2.1] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
(2)	[F20-OP2.1] [F20, F22-OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20-OS2.1] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
(3)	
9.17.4.3.	**Columns in Contact with Concrete**
(1)	[F80-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F80-OH4] Applies to floors and elements that support floors.
	[F80-OP2.4] [F80-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F80-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F80-OS3.1] Applies to floors and elements that support floors.
9.17.4.4.	**Wood Column Termite Protection**
(1)	[F80, F82-OP2.3, OP2.4]
	[F80, F82-OS2.3]
9.17.5.1.	**Materials**
(1)	[F20-OP2.1] [F20, F22-OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F11-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20-OS2.1] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
9.17.5.2.	**Sizes**
(1)	[F20-OP2.1] [F20, F22-OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20-OS2.1] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
9.17.6.1.	**Materials**
(1)	
9.17.6.2.	**Sizes**
(1)	[F20-OP2.1] [F20, F22-OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20-OS2.1] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
9.18.1.1.	**Application**

Acceptable Solution	Objectives and Functional Statements
(1)	
9.18.1.2.	**Foundations**
(1)	
9.18.1.3.	**Heated and Unheated Crawl Spaces**
(1)	
(2)	
(3)	
9.18.2.1.	**Access Openings**
(1)	[F82-OH1.1, OH1.2]
(2)	[F42-OH2.4, OH2.5] Applies where crawl spaces are heated or unheated and access is from the exterior.
	[F51, F63-OS2.3] Applies where crawl spaces are unheated and access is from the interior. [F42, F61-OS2.3] Applies where crawl spaces are heated or unheated and access is from the exterior.
	[F63-OS2.3] Applies where crawl spaces are unheated and access is from the interior. [F42, F61-OS2.3] Applies where crawl spaces are heated or unheated and access is from the exterior.
9.18.3.1.	**Ventilation of Unheated Crawl Spaces**
(1)	[F62-OH1.1]
	[F62-OS2.3]
(2)	[F62-OH1.1]
	[F62-OS2.3]
(3)	(a) [F62-OH1.1, OH1.2]
	(a), (b) [F42, F61, F62-OS2.3]
	(b) [F42, F61-OH1.1, OH1.2]
	(b) [F42-OH2.3, OH2.5]
9.18.3.2.	**Ventilation of Heated Crawl Spaces**
(1)	
9.18.4.1.	**Access Way to Services**
(1)	[F82-OH1.1, OH1.2]
	[F82-OH2.1]
9.18.5.1.	**Drainage**
(1)	[F60-OH1.1, OH1.2]
	[F60-OS2.3]
(2)	
(3)	
(4)	
9.18.6.1.	**Ground Cover in Unheated Crawl Spaces**
(1)	[F61-OH1.1, OH1.2]
	[F61-OS2.3]
(2)	[F61-OH1.1, OH1.2]
	[F61-OS2.3]
9.18.6.2.	**Ground Cover in Heated Crawl Spaces**
(1)	[F40, F61-OH1.1] [F61-OH1.2]
	[F61-OS2.3]
(2)	[F40, F61-OH1.1] [F61-OH1.2]
	[F61-OS2.3]
(3)	[F40-OH1.1]
9.18.7.1.	**Crawl Spaces as Warm Air Plenums**
(1)	[F51-OH1.1, OH1.2]
	[F51-OS2.3]
(2)	[F02-OS1.2]
(3)	[F01-OS1.1]
9.19.1.1.	**Required Venting**

Acceptable Solution	**Objectives and Functional Statements**
(1)	[F51, F62-OS2.3]
	[F51, F62-OH1.1, OH1.2] [F51-OH1.3] Applies to sloped roof assemblies that may be subject to ice damming.
9.19.1.2.	**Vent Requirements**
(1)	[F51, F62-OS2.3]
	[F51, F62-OH1.1, OH1.2] [F51-OH1.3] Applies to sloped roof assemblies that may be subject to ice damming.
(2)	[F51, F62-OS2.3]
	[F51, F62-OH1.1, OH1.2] [F51-OH1.3] Applies to sloped roof assemblies that may be subject to ice damming.
(3)	[F51, F62-OS2.3]
	[F51, F62-OH1.1, OH1.2] [F51-OH1.3] Applies to sloped roof assemblies that may be subject to ice damming.
(4)	[F51, F62-OS2.3]
	[F51, F61-OH1.1, OH1.2] [F51-OH1.3] Applies to sloped roof assemblies that may be subject to ice damming.
(5)	[F42, F51, F61, F62-OS2.3]
	[F42-OH1.1] Applies to resistance to the entry of insects. [F51, F61, F62-OH1.1, OH1.2, OH1.3]
	[F42-OH2.5] Applies to resistance to the entry of insects.
9.19.1.3.	**Clearances**
(1)	[F51, F62-OH1.1, OH1.2, OH1.3]
	[F51, F62-OS2.3]
(2)	[F51, F62-OH1.1, OH1.2, OH1.3]
	[F51, F62-OS2.3]
(3)	[F51, F62-OH1.1, OH1.2, OH1.3]
	[F51, F62-OS2.3]
9.19.1.4.	**Mansard or Gambrel Roof**
(1)	
(2)	
9.19.2.1.	**Access**
(1)	[F82-OH1.1, OH1.2, OH1.3]
	[F82-OS2.3]
(2)	[F82-OH1.1, OH1.2]
	[F82-OS2.3]
(3)	[F42-OH1.1] Applies where access is from an unheated enclosed space. [F51-OH1.2] Applies where access is from an interior heated space. [F42-OH1.1] [F61-OH1.1, OH1.2, OH1.3] Applies where access is from the exterior.
	[F42-OH2.5] Applies where access is from the exterior or an unheated enclosed space.
	[F42, F61-OS2.3] Applies where access is from the exterior or an unheated enclosed space.
9.20.1.1.	**General**
(1)	
(2)	
9.20.1.2.	**Earthquake Reinforcement**
(1)	
(2)	
9.20.2.1.	**Masonry Unit Standards**
(1)	[F20, F80-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in *chimneys* and fireplaces.
	[F20, F80-OH4] Applies to floors and elements that support floors.
	[F01-OP1.2] Applies to masonry used in *chimneys* and fireplaces. [F20, F80-OP1.2] Applies to assemblies required to provide fire resistance.

Acceptable Solution	Objectives and Functional Statements
	[F20, F80-OP2.1, OP2.4] [F20, F80-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F01-OS1.1, OS1.2] Applies to masonry used in *chimneys* and fireplaces. [F20, F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20, F80-OS2.1] [F20, F80-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20, F80-OS3.1] Applies to floors and elements that support floors. [F20, F80-OS3.4] Applies to masonry used in *chimneys* and fireplaces.
9.20.2.2.	**Used Brick**
(1)	[F20, F80-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in *chimneys* and fireplaces.
	[F20, F80-OH4] Applies to floors and elements that support floors.
	[F01-OP1.2] Applies to masonry used in *chimneys* and fireplaces. [F20, F80-OP1.2] Applies to assemblies required to provide fire resistance.
	[F20, F80-OP2.1, OP2.4] [F20, F80-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F01-OS1.1, OS1.2] Applies to masonry used in *chimneys* and fireplaces. [F20, F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20, F80-OS2.1] [F20, F80-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20, F80-OS3.1] Applies to floors and elements that support floors. [F20, F80-OS3.4] Applies to masonry used in *chimneys* and fireplaces.
9.20.2.3.	**Glass Blocks**
(1)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in *chimneys* and fireplaces.
	[F20-OH4] Applies to floors and elements that support floors.
	[F01, F20-OP1.1] [F20-OP1.2] Applies to assemblies required to provide fire resistance.
	[F20-OP2.1, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F01, F20-OS1.1] [F20-OS1.2] Applies to assemblies required to provided fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20-OS3.1] Applies to floors and elements that support floors. [F01, F20-OS3.4] Applies to masonry used in *chimneys* and fireplaces.
9.20.2.4.	**Cellular Concrete**
(1)	[F80-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in *chimneys* and fireplaces.
	[F80-OH4] Applies to floors and elements that support floors.
	[F80-OP1.2] Applies to masonry used in *chimneys* and fireplaces.
	[F80-OP1.2, OP2.4] [F80-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F80-OS2.1] [F80-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F80-OS3.1] Applies to floors and elements that support floors. [F80-OS3.4] Applies to masonry used in *chimneys* and fireplaces.
9.20.2.5.	**Stone**

Acceptable Solution	Objectives and Functional Statements
(1)	[F20, F80-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in *chimneys* and fireplaces.
	[F20, F80-OH4] Applies to floors and elements that support floors.
	[F01, F20, F80-OP1.2] Applies to masonry used in *chimneys* and fireplaces. [F20, F80-OP1.2] Applies to assemblies required to provide fire resistance.
	[F20, F80-OP2.1, OP2.4] [F20, F80-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F01-OS1.1, OS1.2] Applies to masonry used in *chimneys* and fireplaces. [F20, F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20, F80-OS2.1] [F20, 80-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
9.20.2.6.	**Concrete Units Exposed to the Weather**
(1)	[F61, F80-OH1.1, OH1.2, OH1.3]
	[F80-OH4] Applies to floors and elements that support floors.
	[F80-OP2.1, OP2.3] [F61-OP2.3]
	[F80-OP1.2] Applies to concrete blocks in *chimneys* and fireplaces.
	[F80-OS2.1, OS2.3] [F61-OS2.3]
	[F80-OS3.1] Applies to elements that support floors. [F80-OS3.4] Applies to masonry used in *chimneys* and fireplaces.
9.20.2.7.	**Compressive Strength**
(1)	[F20, F80-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental and to masonry used in *chimneys* and fireplaces.
	[F20, F80-OH4] Applies to floors and elements that support floors.
	[F01, F20, F80-OP1.2] Applies to masonry used in *chimneys* and fireplaces. [F20, F80-OP1.2] Applies to assemblies required to provide fire resistance.
	[F20, F80-OP2.1, OP2.4] [F20, F80-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F01-OS1.1, OS1.2] Applies to masonry used in *chimneys* and fireplaces. [F20, F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20, F80-OS2.1] [F20, F80-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20, F80-OS3.1] Applies to floors and elements that support floors. [F20, F80-OS3.4] Applies to masonry used in *chimneys* and fireplaces.
9.20.3.1.	**Mortar Materials**
(1)	[F20, F80-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in *chimneys* and fireplaces.
	[F20, F80-OH4] Applies to floors and elements that support floors.
	[F20, F80-OP2.1, OP2.4] [F20, F80-OP2.3] Applies to elements support or are part of an environmental separator.
	[F20, F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20, F80-OS2.1] [F20, F80-OS2.3] Applies to elements that support or are part of an environmental separator.
(2)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.

Acceptable Solution	Objectives and Functional Statements
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20-OS3.1] Applies to floors and elements that support floors.
(3)	[F21-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in *chimneys* and fireplaces.
	[F21-OH4] Applies to floors and elements that support floors.
	[F21-OP2.1, OP2.4] [F21-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F21-OS1.2] Applies to assemblies required to provide fire resistance.
	[F21-OS2.1] [F21-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F21-OS3.1] Applies to floors and elements that support floors.
(4)	[F21-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in *chimneys* and fireplaces.
	[F21-OH4] Applies to floors and elements that support floors.
	[F21-OP2.1, OP2.4] [F21-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F21-OS1.2] Applies to assemblies required to provide fire resistance.
	[F21-OS2.1] [F21-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F21-OS3.1] Applies to floors and elements that support floors.
9.20.3.2.	**Mortar and Grout Mixes**
(1)	[F20, F21, F61-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in *chimneys* and fireplaces.
	[F20, F21, F61-OH4] Applies to floors and elements that support floors.
	[F20, F21, F61-OP2.1, OP2.4] [F20, F21, F61-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F21-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20, F21, F61-OS2.1] [F20, F21, F61-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F21, F61-OS3.1] Applies to floors and elements that support floors.
(2)	(a) [F21, F55, F61-OH1.1, OH1.2, OH1.3]
	(a) [F21, F55, F61-OP2.1, OP2.3]
	(a) [F21, F55, F61-OS2.1, OS2.3]
	(b) [F2-OP2.1]
	(b) [F21, F44-OS1.2] Applies to assemblies required to provide fire resistance.
	(b) [F21-OS2.1]
(3)	[F20, F21, F61-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in *chimneys* and fireplaces.
	[F20, F21, F61-OH4] Applies to floors and elements that support floors.
	[F20, F21, F61-OP2.1, OP2.4] [F20, F21, F61-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F21-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20, F21, F61-OS2.1] [F20, F21, F61-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F21, F61-OS3.1] Applies to floors and elements that support floors.
(4)	[F20, F21-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in *chimneys* and fireplaces.

Acceptable Solution	Objectives and Functional Statements
	[F20, F21-OH4] Applies to floors and elements that support floors.
	[F20, F21-OP2.1, OP2.4] [F20, F21-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F21-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20, F21-OS2.1] [F20, F21-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F21-OS3.1] Applies to floors and elements that support floors.
(5)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in *chimneys* and fireplaces.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
(6)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator or are part of an environmental separator and to masonry used in *chimneys* and fireplaces.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
(7)	[F20, F21, F61-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in *chimneys* and fireplaces.
	[F20, F21, F61-OH4] Applies to floors and elements that support floors.
	[F20, F21, F61-OP2.1, OP2.4] [F20, F21, F61-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F21, F61-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20, F21, F61-OS2.1] [F20, F21, F61-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F21, F61-OS3.1] Applies to floors and elements that support floors.
9.20.4.1.	**Thickness**
(1)	[F20, F61-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F61-OH4] Applies to floors and elements that support floors.
	[F20, F61-OP2.1, OP2.4] [F20, F61-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20, F61-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20, F61-OS2.1] [F20, F61-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20, F61-OS3.1] Applies to floors and elements that support floors.
(2)	[F20, F61-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F61-OH4] Applies to floors and elements that support floors.
	[F20, F61-OP2.1, OP2.4] [F20, F61-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20, F61-OS1.2] Applies to assemblies required to provide fire resistance.

Acceptable Solution	Objectives and Functional Statements
	[F20, F61-OS2.1] [F20, F61-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20, F61-OS3.1] Applies to floors and elements that support floors.
9.20.4.2.	**Solid Masonry Units**
(1)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in *chimneys* and fireplaces.
	[F20-OH4] Applies to elements that support floors.
	[F20-OP2.1, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20-OS3.1] Applies to elements that support floors.
9.20.4.3.	**Hollow Masonry Units**
(1)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in *chimneys* and fireplaces.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20-OS3.1] Applies to floors and elements that support floors.
(2)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in *chimneys* and fireplaces.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
9.20.5.1.	**Masonry Support**
(1)	[F20, F21-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F21-OH4] Applies to floors and elements that support floors.
	[F20, F21-OP2.1, OP2.4] [F20, F21-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20, F21-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20, F21-OS2.1] [F20, F21-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20, F21-OS3.1] Applies to floors and elements that support floors.
(2)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.

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	[F20-OS2.1] [F20-OS2.2] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20-OS3.1] Applies to floors and elements that support floors.
9.20.5.2.	**Lintels or Arches**
(1)	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20, F22–OP2.1, OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20, F22-OS2.1] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
(2)	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OP2.1, OP2.3, OP2.4]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20, F22-OS2.1, OS2.3]
(3)	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OP2.1, OP2.3, OP2.4]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20, F22-OS2.1, OS2.3]
(4)	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OP2.1, OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20, F22-OS2.1] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
(5)	[F80-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F80-OH4] Applies to floors and elements that support floors.
	[F80-OP2.1, OP2.4] [F80-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F80-OS2.1] [F80-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F80-OS3.1] Applies to floors and elements that support floors.
	[F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(6)	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OP2.1, OP2.3, OP2.4]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20, F22-OS2.1, OS2.3]
(7)	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OP2.1, OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.

Acceptable Solution	Objectives and Functional Statements
	[F20, F22-OS2.1] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
9.20.6.1.	**Thickness of Exterior Walls**
(1)	[F20-OP2.1, OP2.4, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
(2)	[F20-OP2.1, OP2.4, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
(3)	[F20-OP2.1, OP2.4, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support are or part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
9.20.6.2.	**Cavity Walls**
(1)	[F20-OP2.1, OP2.4, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assembles required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
(2)	[F20-OP2.1, OP2.4, OP2.5] [F22-OP2.4, OP2.5] [F20, F22, F61-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F61-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22, F61-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors.

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	[F20, F22, F61-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
(3)	[F20-OP2.1, OP2.4, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
9.20.6.3.	**Thickness of Interior Walls**
(1)	
(2)	(b) [F20-OP2.1, OP2.3, OP2.5] [F22-OP2.5]
	(b) [F20-OS2.1, OS2.3, OS2.5] [F22-OS2.5]
9.20.6.4.	**Masonry Veneer**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.5] [F20, F22-OP2.3] Applies to elements that are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that are part of an environmental separator.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that are part of an environmental separator.
(2)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OP2.3]
	[F61-OS1.2] Applies to assemblies required to provide fire resistance.
	[F61-OS2.3]
(3)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.5]
(4)	
9.20.6.5.	**Parapet Walls**
(1)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.5]
	[F20-OS2.1, OP2.3, OP2.5] [F22-OS2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
(2)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OP2.3]
	[F61-OS1.2]
	[F61-OS2.3]
9.20.6.6.	**Stone or Concrete Facings**
(1)	
9.20.7.1.	**Maximum Dimensions**
(1)	[F20-OP2.1, OP2.4, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.

Acceptable Solution	Objectives and Functional Statements
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
9.20.7.2.	**Minimum Wall Thickness**
(1)	[F20-OP2.1, OP2.4, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
(2)	[F20-OP2.1, OP2.4, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are a part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
9.20.7.3.	**Separation of Chases and Recesses**
(1)	[F20-OP2.1, OP2.4, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
9.20.7.4.	**Non-Conforming Chases or Recesses**
(1)	[F20-OP2.1, OP2.4, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
9.20.7.5.	**Chases or Recesses Cut into Walls**
(1)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.

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	[F20-OS1.2] Applies to assemblies required to provide fire resistance
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator
	[F20-OS3.1] Applies to floors and elements that support floors
9.20.8.1.	**Capping of Hollow Masonry Walls**
(1)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator
	[F20-OH4] Applies to floors and elements that support floors
	[F20-OP2.1, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator
	[F20-OS1.2] Applies to assemblies required to provide fire resistance
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator
	[F20-OS3.1] Applies to floors and elements that support floors
(2)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator
	[F20-OH4] Applies to floors and elements that support floors
	[F20-OP2.1, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator
	[F20-OS3.1] Applies to floors and elements that support floors
9.20.8.2.	**Cavity Walls Supporting Framing Members**
(1)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator
	[F20-OH4] Applies to floors and elements that support floors
	[F20-OP2.1, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator
	[F20-OS1.2] Applies to assemblies required to provide fire resistance
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator
	[F20-OS3.1] Applies to floors and elements that support floors
(2)	[F80-OP2.3]
	[F80-OS2.3]
(3)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator
	[F20-OH4] Applies to floors and elements that support floors
	[F20-OP2.1, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator
	[F20-OS1.2] Applies to assemblies required to provide fire resistance
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator
	[F20-OS3.1] Applies to floors and elements that support floors
9.20.8.3.	**Bearing of Beams and Joists**
(1)	[F20-OP2.1] [F20-OP2.3] Applies to elements that support or are part of an environmental separator
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator
(2)	[F20-OP2.1] [F20-OP2.3] Applies to elements that support or are part of an environmental separator
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator
(3)	[F20-OP2.1] [F20-OP2.3] Applies to elements that support or are part of an environmental separator
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator

Acceptable Solution	Objectives and Functional Statements
9.20.8.4.	**Support of Beams and Columns**
(1)	[F20-OP2.1, OP2.4, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
(2)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1, OP2.2] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
(3)	[F20-OP2.1, OP2.4, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
(4)	[F20-OP2.1, OP2.4, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
(5)	[F20-OP2.1, OP2.4, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.4, OS2.5] [F22-OS2.4, OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
9.20.8.5.	**Distance to Edge of Supporting Members**
(1)	[F20-OP2.1, OP2.4, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.

Acceptable Solution	Objectives and Functional Statements
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
(2)	[F20-OP2.1, OP2.4, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
(3)	
9.20.9.1.	**Joints to be Offset or Reinforced**
(1)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
(2)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
9.20.9.2.	**Bonding or Tying of Other than Masonry Veneer**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors. [F20, F22-OS3.7] Applies to walls, and elements that support walls, that contains doors or windows required for emergency egress.
9.20.9.3.	**Bonding**
(1)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.

Acceptable Solution	Objectives and Functional Statements
(2)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
(3)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
9.20.9.4.	**Tying**
(1)	
(2)	[F20, F80-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F80-OH4] Applies to floors and elements that support floors.
	[F20, F80-OP2.1, OP2.4] [F20, F80-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20, F80-OS2.1] [F20, F80-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F80-OS3.1] Applies to floors and elements that support floors. [F20, F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(3)	[F20, F80-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F80-OH4] Applies to floors and elements that support floors.
	[F20, F80-OP2.1, OP2.4] [F20, F80-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20, F80-OS2.1] [F20, F80-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F80-OS3.1] Applies to floors and elements that support floors. [F20, F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows for emergency egress.
(4)	[F20, F80-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F80-OH4] Applies to floors and elements that support floors.
	[F20, F80-OP2.1, OP2.4] [F20, F80-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20, F80-OS2.1] [F20, F80-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F80-OS3.7] Applies to floors and elements that support floors. [F20, F80-OS3.7] Applies to walls, and elements that support walls, that contain doors and windows required for emergency egress.
(5)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.

Acceptable Solution	Objectives and Functional Statements
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
(6)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
(7)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
(8)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
(9)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
9.20.9.5.	**Ties for Masonry Veneer**
(1)	[F20, F22, F80-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22, F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20, F80-OP2.1] [F20, F22, F80-OP2.5] [F20, F22, F80-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F80-OS2.1] [F20, F22, F80-OS2.5] [F20, F22, F80-OS2.3] Applies to elements that support or are part of an environmental separator.
(2)	[F20, F80-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F80-OP2.1] [F20, F80-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F80-OS1.2] Applies to assemblies required to provide fire resistance.

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	[F20, F80-OS2.1] [F20, F80-OS2.3] Applies to elements that support or are part of an environmental separator.
(3)	
(4)	[F20, F22, F80-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22, F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20, F80-OP2.1] [F20, F22, F80-OP2.5] [F20, F22, F80-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F80-OS2.1] [F20, F22, F80-OS2.5] [F20, F22, F80-OS2.3] Applies to elements that support or are part of an environmental separator.
9.20.9.6.	**Reinforcing for Glass Block**
(1)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that are part of an environmental separator.
	[F20-OP2.1] [F20-OP2.3] Applies to elements that are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that are part of an environmental separator.
(2)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that are part of an environmental separator.
	[F20-OP2.1] [F20-OP2.3] Applies to elements that are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that are part of an environmental separator.
9.20.10.1.	**Lateral Support Required**
(1)	[F20-OP2.1] [F20, F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20, F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
(2)	[F20-OP2.1, OP2.4] [F20, F22-OP2.5]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20, F22-OS2.5]
	(a) [F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	(a) [F20, F22-OH4] Applies to floors and elements that support floors.
	(a) [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	(a) [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	(a) [F20, F22-OS3.1] Applies to floors and elements that support floors.
(3)	
(4)	[F20-OP2.1] [F20, F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.

Acceptable Solution	Objectives and Functional Statements
	[F20, F22-OH4] Applies to floors and elements that support fire resistance.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20, F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
9.20.11.1.	**Anchorage of Floor or Roof Assemblies**
(1)	[F20-OP2.1] [F20, F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20, F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
(2)	[F20, F80-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F80-OH4] Applies to floors and elements that support floors.
	[F20, F80-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20, F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20, F80-OS2.1] [F20, F80-OS2.3] Applies to elements that support are part of an environmental separator.
	[F20, F80-OS3.1] Applies to floors and elements that support walls. [F20, F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(3)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
(4)	[F20-OP2.1] [F20, F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20, F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
9.20.11.2.	**Bonding and Tying of Intersecting Walls**
(1)	[F20-OP2.1] [F20, F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.

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	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20, F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
(2)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors
	[F20-OP2.1, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
(3)	[F20, F80-OH1.1, OH1.2, OH1.3] Applies to elements that support floors or are part of an environmental separator.
	[F20, F80-OH4] Applies to floors and elements that support floors.
	[F20, F80-OP2.1, OP2.4] [F20, F80-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20, F80-OS2.1] [F20, F80-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F80-OS3.1] Applies to floors and elements that support floors. [F20, F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.20.11.3.	**Wood Frame Walls Intersecting Masonry Walls**
(1)	[F20, F22, F80-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22, F80-OH4] Applies to floors and elements that support floors.
	[F20, F22, F80-OS1.2] Applies to assemblies to provide fire resistance.
	[F20, F80-OS2.1] [F20, F22, F80-OS2.5] [F20, F22, F80-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22, F80-OS3.1] Applies to floors and elements that support floors. [F20, F22, F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
	[F20, F80-OP2.1] [F20, F22, F80-OP2.4, OP2.5] [F20, F22, F80-OP2.3] Applies to elements that support or are part of an environmental separator.
(2)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
9.20.11.4.	**Wood Frame Roof Systems**
(1)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OP2.1, OP2.3]
	[F20-OS2.1, OS2.3]
(2)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OP2.1, OP2.3]
	[F20-OS2.1, OS2.3]

Acceptable Solution	Objectives and Functional Statements
9.20.11.5.	**Cornices, Sills and Trim**
(1)	[F20, F80-OS2.1, OS2.3, OS2.5] [F22-OS2.5]
9.20.11.6.	**Piers**
(1)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
9.20.12.1.	**Corbelling**
(1)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
(2)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
9.20.12.2.	**Corbelling for Cavity Walls**
(1)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1, OP2.4] [F20-OP2.3] Applies to elements that support or are part of environmental separator.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
(2)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
9.20.12.3.	**Corbelling for Masonry Veneer**
(1)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OP2.1] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
(2)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OP2.1] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.

Acceptable Solution	Objectives and Functional Statements
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
9.20.13.1.	**Materials for Flashing**
(1)	[F80-OH1.1, OH1.2, OH1.3]
	[F20-OP2.1, OP2.3]
	[F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F80-OS2.1, OS2.3]
(2)	[F80-OH1.1, OH1.2, OH1.3]
	[F20-OP2.1, OP2.3]
	[F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F80-OS2.1, OS2.3]
9.20.13.2.	**Fastening of Flashing**
(1)	[F80-OH1.1, OH1.2, OH1.3]
	[F20-OP2.1, OP2.3]
	[F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F80-OS2.1, OS2.3]
9.20.13.3.	**Location of Flashing**
(1)	[F61, F62-OH1.1, OH1.2, OH1.3]
	[F61, F62-OP2.1, OP2.3]
	[F61, F62-OS2.1, OS2.3]
(2)	[F61, F62-OH1.1, OH1.2, OH1.3]
	[F61, F62-OP2.1, OP2.3]
	[F61, F62-OS2.1, OS2.3]
9.20.13.4.	**Extension of Flashing**
(1)	
(2)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OP2.1, OP2.3]
	[F61-OS1.2] Applies to assemblies required to provide fire resistance.
	[F61-OS2.1, OS2.3]
9.20.13.5.	**Flashing for Weep Holes in Masonry Veneer/Masonry Walls**
(1)	[F61, F62-OH1.1, OH1.2, OH1.3]
	[F61, F62-OP2.1, OP2.3]
	[F61-OS1.2] Applies to assemblies required to provide fire resistance.
	[F61, F62-OS2.1, OS2.3]
9.20.13.6.	**Flashing for Weep Holes in Veneer**
(1)	
(2)	[F61, F62-OH1.1, OH1.2, OH1.3]
	[F61, F62-OP2.1, OP2.3]
	[F61-OS1.2] Applies to assemblies required to provide fire resistance.
	[F61, F62-OS2.1, OS2.3]
(3)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OP2.1, OP2.3]
	[F61-OS1.2] Applies to assemblies required to provide fire resistance.
	[F61-OS2.1, OS2.3]
(4)	
9.20.13.7.	**Flashing Joints**
(1)	[F61, F62-OH1.1, OH1.2, OH1.3]
	[F61, F62-OP2.1, OP2.3]
	[F61-OS1.2] Applies to assemblies required to provide fire resistance.
	[F61, F62-OS2.1, OS2.3]
9.20.13.8.	**Required Weep Holes**

Acceptable Solution	Objectives and Functional Statements
(1)	[F62-OH1.1, OH1.2, OH1.3]
	[F62-OP2.1, OP2.3]
	[F62-OS1.2] Applies to assemblies required to provide fire resistance.
	[F62-OS2.1, OS2.3]
(2)	
(3)	[F61, F62-OH1.1, OH1.2, OH1.3]
	[F61, F62-OP2.1, OP2.3]
	[F61, F62-OS2.1, OS2.3]
9.20.13.9.	**Protection of Interior Finish**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OP2.1, OP2.3]
	[F61-OS2.1, OS2.3]
(2)	[F61, F62-OH1.1, OH1.2, OH1.3]
	[F61, F62-OP2.1, OP2.3]
	[F61, F62-OS2.1, OS2.3]
(3)	
9.20.13.10.	**Mortar Droppings**
(1)	[F61, F62-OH1.1, OH1.2, OH1.3]
	[F61, F62-OP2.1, OP2.3]
	[F61, F62-OS1.2] Applies to assemblies required to provide fire resistance.
	[F61, F62-OS2.1, OS2.3]
9.20.13.11.	**Caulking at Door and Window Frames**
(1)	
9.20.13.12.	**Drips Beneath Window Sills**
(1)	[F61, F62-OH1.1, OH1.2, OH1.3]
	[F61, F62-OP2.1, OP2.3]
	[F61, F62-OS1.2] Applies to assemblies required to provide fire resistance.
	[F61, F62-OS2.1, OS2.3]
9.20.14.1.	**Laying Temperature of Mortar and Masonry**
(1)	[F20, F80-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F80-OH4] Applies to floors and elements that support floors.
	[F20, F80-OP2.1, OP2.4] [F20, F80-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20, F80-OS1.2] Applies to assemblies required to provide fire resistance. [F20, F80-OS1.3]
	[F20, F80-OS2.1] [F20, F80-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20, F80-OS3.1] Applies to floors and elements that support floors. [F20, F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	[F20, F80-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F80-OH4] Applies to floors and elements that support floors.
	[F20, F80-OP2.1, OP2.4] [F20, F80-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20, F80-OS1.2] Applies to assemblies required to provide fire resistance. [F20, F80-OS1.3]
	[F20, F80-OS2.1] [F20, F80-OS2.3] Applies to elements that support or are part of environmental separator or are exposed to moisture.

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	[F20, F80-OS3.1] Applies to floors and elements that support floors. [F20, F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.20.14.2.	**Protection from Weather**
(1)	[F80-OP2.1, OP2.3]
	[F80-OS2.1, OS2.3]
9.20.15.1.	**Amount of Reinforcement**
(1)	[F20-OP2.1, OP2.3]
	[F20-OS2.1, OS2.3]
9.20.15.2.	**Installation Standard**
(1)	
9.20.16.1.	**Corrosion Resistance of Connectors**
(1)	[F80-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F80-OH4] Applies to floors and elements that support floors.
	[F80-OP2.1, OP2.4] [F80-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F80-OS2.1] [F80-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F80-OS3.1] Applies to floors and elements that support floors. [F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.20.17.1.	**Thickness of Flat Insulating Concrete Form Walls**
(1)	[F20-OP2.1] [F22-OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20-OS2.1] [F22-OS2.4] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors. [F20, F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.20.17.2.	**Reinforcement for Flat Insulating Concrete Form Walls**
(1)	[F20-OP2.1] [F22-OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20-OS2.1] [F22-OS2.4] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors. [F20, F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	[F20-OP2.1] [F22-OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.

Acceptable Solution	Objectives and Functional Statements
	[F20-OS2.1] [F22-OS2.4] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors. [F20, F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(3)	[F20-OP2.1] [F22-OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F22-OS2.4] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS3.1] Applies to floors and elements that support floors. [F20, F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.20.17.3.	**Openings in Flat Non-Loadbearing Insulating Concrete Form Walls**
(1)	[F20-OP2.1, OP2.3] [F22-OP2.3, OP2.4]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20-OS2.1, OS2.3] [F22-OS2.3, OS2.4]
	[F20, F22-OS3.1] Applies to floors and elements that support floors. [F20, F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency.
(2)	[F20-OP2.1] [F22-OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20-OS2.1] [F22-OS2.4] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors. [F20, F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(3)	[F20-OP2.1] [F22-OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20-OS2.1] [F22-OS2.4] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors. [F20, F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(4)	[F20-OP2.1] [F22-OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.

Acceptable Solution	Objectives and Functional Statements
	[F20-OS2.1] [F22-OS2.4] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors. [F20, F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(5)	[F20-OP2.1] [F22-OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20-OS2.1] [F22-OS2.4] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors. [F20, F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(6)	[F20-OP2.1] [F22-OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20-OS2.1] [F22-OS2.4] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors. [F20, F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.20.17.4.	**Lintels over Openings in Loadbearing Flat Insulating Concrete Form Walls**
(1)	[F20-OP2.1] [F22-OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20-OS2.1] [F22-OS2.4] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors. [F20, F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	[F20-OP2.1] [F22-OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20-OS2.1] [F22-OS2.4] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.7] Applies to floors and elements that support floors. [F20, F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(3)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.

Acceptable Solution	Objectives and Functional Statements
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
9.20.17.5.	**Framing Supported on Flat Insulating Concrete Form Walls**
(1)	[F20, F22-OH4]
	[F20-OP2.1] [F22-OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F22-OS2.4] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1]
(2)	[F20, F22-OH4]
	[F20-OP2.1] [F22-OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F22-OS2.4] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1]
(3)	[F20, F22-OH4]
	[F20-OP2.1] [F22-OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F22-OS2.4] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1]
(4)	
9.20.17.6.	**Anchoring of Roof Framing to Top of Flat Insulating Concrete Form Walls**
(1)	[F20-OP2.1, OP2.3] [F22-OP2.3, OP2.4]
	[F20-OS2.1, OS2.3] [F22-OS2.3, OS2.4]
	[F20, F22-OH1.1, OH1.2, OH1.3]
(2)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OP2.1, OP2.3] [F22-OP2.3, OP2.4]
	[F20-OS2.1, OS2.3] [F22-OS2.3, OS2.4]
(3)	
9.20.17.7.	**Protection from Precipitation and Damage**
(1)	
9.21.1.1.	**Application**
(1)	
(2)	
9.21.1.2.	**Factory-Built Chimneys**
(1)	[F01-OP1.1] Applies to the walls of any *chimney* or *flue pipe*, which are required to be constructed to be flame-tight.
	[F01-OS1.1] Applies to the walls of any *chimney* or *flue pipe*, which are required to be constructed to be flame-tight.
	[F44-OH1.1] Applies to the walls of any *chimney* or *flue pipe*, which are required to be constructed to be smoke-tight.
9.21.1.3.	**Chimneys, Gas Vents or Flue Pipes**
(1)	
(2)	[F01-OP1.1] Applies to the walls of any *chimney* or *flue pipe*, which are required to be constructed to be flame-tight.

Acceptable Solution	Objectives and Functional Statements
	[F01-OS1.1] Applies to the walls of any *chimney* or *flue pipe*, which are required to be constructed to be flame-tight.
	[F44-OH1.1] Applies to the walls of any *chimney* or *flue pipe*, which are required to be constructed to be smoke-tight.
9.21.1.4.	**Chimney or Flue Pipe Walls**
(1)	[F01-OP1.1] Applies to the walls of any *chimney* or *flue pipe*, which are required to be constructed to be flame-tight.
	[F01-OS1.1] Applies to the walls of any *chimney* or *flue pipe*, which are required to be constructed to be flame-tight.
	[F44-OH1.1] Applies to the walls of any *chimney* or *flue pipe*, which are required to be constructed to be smoke-tight.
9.21.2.1.	**Chimney Flue Limitations**
(1)	[F44-OH1.1]
	[F44-OS3.4]
(2)	[F44-OH1.1]
	[F44-OS3.4]
(3)	[F44-OH1.1]
	[F44-OS3.4]
9.21.2.2.	**Connections of More Than One Appliance**
(1)	[F44-OH1.1]
	[F44-OS3.4]
(2)	[F44-OS3.4]
(3)	[F44-OH1.1]
	[F44-OS3.4]
9.21.2.3.	**Inclined Chimney Flues**
(1)	[F44-OH1.1]
	[F44-OS3.4]
9.21.2.4.	**Size of Chimney Flues**
(1)	
(2)	[F44-OH1.1]
	[F44-OS3.4]
9.21.2.5.	**Fireplace Chimneys**
(1)	[F44-OH1.1]
	[F44-OS3.4]
9.21.2.6.	**Oval Chimney Flues**
(1)	[F44-OH1.1]
	[F44-OS3.4]
9.21.3.1.	**Lining Materials**
(1)	[F20-OH1.1]
	[F01-OS1.1]
	[F20-OS2.3]
	[F44-OS3.4]
	[F01, F20, F44-OP1.1]
9.21.3.2.	**Joints in Chimney Liners**
(1)	[F01-OP1.1]
	[F44-OH1.1]
	[F01-OS1.1]
	[F20, F44-OS2.3]
	[F01-OS3.4]
(2)	[F01-OP1.1]
	[F44-OH1.1]
	[F01-OS1.1]

Acceptable Solution	Objectives and Functional Statements
	[F01-OS3.4]
9.21.3.3.	**Clay Liners**
(1)	[F01-OS1.1]
	[F20-OS2.2]
	[F20, F44-OS3.4]
	[F01, F20-OP1.1]
	[F20, F44-OH1.1]
(2)	[F01, F20-OP1.1]
	[F44-OH1.1]
	[F01, F20-OS1.1]
	[F20-OS2.3] Applies to the liners referred to in Sentence (1), which are required to be not less than 15.9 mm thick
	[F44-OS3.4]
9.21.3.4.	**Firebrick Liners**
(1)	[F01-OP1.1]
	[F01-OS1.1]
	[F20, F44-OS3.4]
	[F44-OH1.1]
(2)	[F01, F20-OP1.1]
	[F20-OH1.1]
	[F01, F20-OS1.1]
	[F20-OS2.2]
	[F20, F44-OS3.4]
9.21.3.5.	**Concrete Liners**
(1)	[F01-OP1.1]
	[F01, F20-OS1.1]
	[F20-OS2.3]
	[F20, F44-OS3.4]
	[F44-OH1.1]
9.21.3.6.	**Metal Liners**
(1)	[F01, F20-OP1.1]
	[F20, F44-OH1.1]
	[F01, F20-OS1.1]
	[F20-OS2.3]
	[F20, F44-OS3.4]
(2)	[F20-OP1.1]
	[F01, F20-OS1.1]
	[F20-OS2.3]
	[F20, F44-OS3.4]
	[F44-OH1.1]
9.21.3.7.	**Installation of Chimney Liners**
(1)	[F01-OP1.1]
	[F01-OS1.1]
	[F20-OS2.3]
	[F44-OS3.4]
	[F44-OH1.1]
9.21.3.8.	**Spaces Between Liners and Surrounding Masonry**
(1)	[F01-OP1.1]
	[F01-OS1.1]
	[F20-OS2.3]
(2)	[F01-OP1.1]

Acceptable Solution	Objectives and Functional Statements
	[F44-OH1.1]
	[F20-OS1.1]
	[F20-OS2.3]
	[F44-OS3.4]
9.21.3.9.	**Mortar for Chimney Liners**
(1)	[F20, F44-OH1.1]
	[F20, F44-OS3.4]
	(a), (b) [F01, F20-OP1.1]
	(a), (b) [F01, F20-OS1.1]
	(b) [F20-OS2.3]
(2)	[F01, F20-OP1.1]
	[F20, F44-OH1.1]
	[F01, F20-OS1.1]
	[F20-OS2.3]
	[F44-OS3.4]
9.21.3.10.	**Extension of Chimney Liners**
(1)	[F01-OP1.1]
	[F01-OS1.1]
	[F20-OS2.3]
	[F44-OS3.4]
	[F20, F44-OH1.1]
9.21.4.1.	**Unit Masonry**
(1)	
9.21.4.2.	**Concrete**
(1)	
9.21.4.3.	**Footings**
(1)	
9.21.4.4.	**Height of Chimney Flues**
(1)	(a), (b) [F44-OH1.1]
	(a), (b) [F44-OS3.4]
9.21.4.5.	**Lateral Stability**
(1)	
(2)	
9.21.4.6.	**Chimney Caps**
(1)	[F01-OP1.1]
	[F20, F44-OH1.1]
	[F01-OS1.1]
	[F20-OS2.3]
	[F44-OS3.4]
(2)	[F20-OS2.3]
(3)	[F01, F20-OP1.1]
	[F01, F20-OS1.1]
	[F20-OS2.3]
	[F20, F44-OS3.4]
(4)	[F01, F20-OP1.1]
	[F20, F44-OH1.1]
	[F01, F20-OS1.1]
	[F20-OS2.3]
	[F20, F44-OS3.4]
9.21.4.7.	**Cleanout**
(1)	[F01-OP1.1]

Acceptable Solution	Objectives and Functional Statements
	[F01-OS1.1]
9.21.4.8.	**Wall Thickness**
(1)	[F01-OP1.1]
	[F22-OP2.1]
	[F01-OS1.1]
	[F20, F22-OS2.1]
9.21.4.9.	**Separation of Flue Liners**
(1)	[F01-OS1.1]
	[F20, F22-OS2.3]
	[F44-OS3.4]
	[F01, F20-OP1.1]
	[F20, F44-OH1.1]
(2)	[F01-OS1.1]
	[F20, F22-OS2.3]
	[F20, F44-OS3.4]
	[F20, F44-OH1.1]
9.21.4.10.	**Flashing**
(1)	[F20, F61-OS2.3]
9.21.5.1.	**Clearance from Combustible Materials**
(1)	(a), (b) [F01-OP1.1]
	(a), (b) [F01-OS1.1]
(2)	[F01-OP1.1]
	[F01-OS1.1]
(3)	[F01-OP1.1]
	[F01-OS1.1]
9.21.5.2.	**Sealing of Spaces**
(1)	[F01-OP1.1]
	[F01-OS1.1]
9.21.5.3.	**Support of Joists or Beams**
(1)	[F01-OP1.1]
	[F01-OS1.1]
9.22.1.1.	**Application**
(1)	
9.22.1.2.	**Masonry and Concrete**
(1)	
(2)	[F22, F20-OS2.3]
9.22.1.3.	**Footings**
(1)	
9.22.1.4.	**Combustion Air**
(1)	[F50, F81-OH1.1]
	[F44, F81-OS3.4]
(2)	[F01, F80-OP1.1] [F03-OP1.2]
	[F01, F80-OS1.1] [F03-OS1.2]
(3)	[F50, F81-OH1.1]
	[F44, F81-OS3.4]
(4)	[F54-OH1.2]
(5)	[F50, F81-OH1.1]
	[F44, F81-OS3.4]
(6)	(a) [F50, F81-OH1.1]
	(a) [F44, F81-OS3.4]
	(b) [F03-OP1.2]

Acceptable Solution	Objectives and Functional Statements
	(b) [F03-OS1.2]
(7)	[F01-OP1.1]
	[F01-OS1.1]
9.22.2.1.	**Brick or Steel Liners**
(1)	[F01, F20-OP1.1]
	[F01, F20-OS1.1]
9.22.2.2.	**Firebrick Liners**
(1)	(a), (b) [F01-OP1.1]
	(a), (b) [F01-OS1.1]
(2)	[F01-OP1.1]
	[F01-OS1.1]
(3)	[F01-OP1.1]
	[F01-OS1.1]
9.22.2.3.	**Steel Liners**
(1)	[F01-OP1.1]
	[F01-OS1.1]
	[F44-OS3.4]
	[F44-OH1.1]
9.22.3.1.	**Thickness of Walls**
(1)	[F01-OP1.1]
	[F01-OS1.1]
(2)	(a), (b) [F01-OP1.1]
	(a), (b) [F01-OS1.1]
9.22.4.1.	**Fire Chamber Dimensions**
(1)	[F22-OH1.1]
	[F44-OS3.4]
9.22.5.1.	**Hearth Extension**
(1)	[F01-OP1.1]
	[F01-OS1.1]
(2)	(a), (b) [F01-OP1.1]
	(a), (b) [F01-OS1.1]
9.22.5.2.	**Support of Hearth**
(1)	[F01-OS1.1]
	[F20-OS2.3]
	[F01, F20-OP1.1]
(2)	[F01-OP1.1]
	[F01-OS1.1]
9.22.6.1.	**Required Damper and Size**
(1)	[F01-OP1.1]
	[F01-OS1.1]
	[F54-OH1.2]
9.22.7.1.	**Slope of Smoke Chamber**
(1)	[F44-OH1.1]
	[F44-OS3.4]
9.22.7.2.	**Wall Thickness**
(1)	[F01-OP1.1]
	[F01-OS1.1]
9.22.8.1.	**Conformance to Standard**
(1)	[F01-OP1.1]
	[F01-OS1.1]
	[F44-OS3.4]

Acceptable Solution	Objectives and Functional Statements
	[F44-OH1.1]
9.22.9.1.	**Clearance to the Fireplace Opening**
(1)	[F01-OP1.1]
	[F01-OS1.1]
9.22.9.2.	**Metal Exposed to the Interior**
(1)	[F01-OP1.1]
	[F01-OS1.1]
9.22.9.3.	**Clearance to Combustible Framing**
(1)	[F01-OP1.1]
	[F01-OS1.1]
(2)	[F01-OP1.1]
	[F01-OS1.1]
9.22.9.4.	**Heat Circulating Duct Openings**
(1)	(a), (b) [F01-OP1.1]
	(a), (b) [F01-OS1.1]
9.22.10.1.	**Installation Standard**
(1)	[F01-OP1.1]
	[F01-OS1.1]
	[F44-OS3.4]
	[F44-OH1.1]
9.22.10.2.	**Installation**
(1)	[F01-OP1.1]
	[F01-OS1.1]
	[F44-OS3.4]
	[F44-OH1.1]
(2)	
(3)	[F01-OP1.1]
	[F01-OS1.1]
	[F44-OS3.4]
	[F44-OH1.1]
9.23.1.1.	**Limitations**
(1)	
(2)	
9.23.2.1.	**Strength and Rigidity**
(1)	[F20-OP2.1] [F20, F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20-OS2.1] [F20, F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls and elements that support walls, that contain doors or windows required for emergency egress.
9.23.2.2.	**Protection from Decay**
(1)	[F80-OP2.3, OP2.4]
	[F80-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F80-OH4] Applies to floors and elements that support floors.
	[F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F80-OS2.3]

Acceptable Solution	Objectives and Functional Statements
	[F80-OS3.1] Applies to floors and elements that support floors. [F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	[F81-OP2.3]
	[F81-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F81-OH4] Applies to floors and elements that support floors.
	[F81-OS1.2] Applies to assemblies required to provide fire resistance.
	[F81-OS2.3]
	[F81-OS3.1] Applies to floors and elements that support floors.
9.23.2.3.	**Protection from Dampness**
(1)	[F80-OP2.1, OP2.3, OP2.4]
	[F80-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F80-OH4] Applies to floors and elements that support floors.
	[F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F80-OS2.1, OS2.3]
	[F80-OS3.1] Applies to floors and elements that support floors.
(2)	
9.23.2.4.	**Lumber**
(1)	
9.23.2.5.	**Termite Protection**
(1)	[F80, F81, F82-OH4]
	[F80, F81, F82-OP2.3, OP2.4]
	[F10-OS1.5]
	[F80, F81, F82-OS2.3]
	[F80, F81, F82-OS3.1]
(2)	[F80, F81, F82-OH4]
	[F80, F81, F82-OP2.3, OP2.4]
	[F80, F81, F82-OS2.3]
	[F80, F81, F82-OS3.1]
9.23.3.1.	**Standards for Nails and Screws**
(1)	[F20-OP2.1] [F20, F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20, F22-OS2.5] [F20, F22-OS2.5] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
(2)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20, F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.

Acceptable Solution	Objectives and Functional Statements
	[F22-OH4] Applies to floors and elements that support floors.
9.23.3.2.	**Length of Nails**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20, F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
9.23.3.3.	**Prevention of Splitting**
(1)	[F80-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F80-OH4] Applies to floors and elements that support floors.
	[F80-OP2.1, OP2.4] [F80-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F80-OS2.1] [F80-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F80-OS3.1] Applies to floors and elements that support floors.
9.23.3.4.	**Nailing of Framing**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20, F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
(2)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20, F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
9.23.3.5.	**Fastening for Sheathing or Subflooring**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.

Acceptable Solution	Objectives and Functional Statements
	[F20-OS2.1] [F20, F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
(2)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20, F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
(3)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20, F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
(4)	[F20-OP2.1] [F22-OP2.4]
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20, F22-OS2.1]
	[F22-OS3.1] Applies to floors and elements that support floors.
	[F22-OH4] Applies to floors and elements that support floors.
9.23.4.1.	**Application**
(1)	
(2)	
9.23.4.2.	**Spans for Joists, Rafters and Beams**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.4, OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.

Acceptable Solution	Objectives and Functional Statements
(2)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.4, OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(3)	[F20-OP2.1, OP2.3, OP2.5]
	[F20-OS2.1, OS2.3, OS2.5]
(4)	[F20-OP2.1, OP2.3, OP2.5]
	[F20-OS2.1, OS2.3, OS2.5]
9.23.4.3.	**Steel Beams**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.4, OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.4, OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(3)	
9.23.4.4.	**Concrete Topping**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.4, OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.

Acceptable Solution	Objectives and Functional Statements
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.4, OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(3)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.4, OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.23.4.5.	**Heavy Roofing Materials**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.4, OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.23.5.1.	**Holes Drilled in Framing Members**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.23.5.2.	**Notching of Framing Members**

Acceptable Solution	Objectives and Functional Statements
(1)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.23.5.3.	**Wall Studs**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.23.5.4.	**Top Plates**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.23.5.5.	**Roof Trusses**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
9.23.6.1.	**Anchorage of Building Frames**
(1)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.

Acceptable Solution	Objectives and Functional Statements
	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
(2)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
(3)	[F20-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
9.23.6.2.	**Anchorage of Columns and Posts**
(1)	[F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F22-OP2.4, OP2.5] [F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS2.4, OS2.5] [F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and the elements that support walls, that contain doors or windows required for emergency egress.
(2)	[F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F22-OP2.4, OP2.5] [F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS2.4, OS2.5] [F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] [F22-OS3.7] Applies to floors and elements that support floors.
9.23.6.3.	**Anchorage of Smaller Buildings**
(1)	[F22-OS2.3, OS2.5]
9.23.7.1.	**Size of Sill Plates**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F22-OS1.2] Applies to assemblies required to provide fire resistance.

Acceptable Solution	Objectives and Functional Statements
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.23.7.2.	**Levelling of Sill Plates**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20-OS2.1, OS2.5] [F22-OS2.4, OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
(2)	
9.23.8.1.	**Bearing for Beams**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.23.8.2.	**Priming of Steel Beams**
(1)	[F80-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F80-OH4] Applies to floors and elements that support floors.
	[F80-OP2.1, OP2.4] [F80-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F80-OS2.1] [F80-OS2.3] Applies to floors and elements that support floors.
	[F80-OS3.1] Applies to floors and elements that support floors.
9.23.8.3.	**Built-up Wood Beams**
(1)	[F20-OP2.1]
	[F20-OS2.1]
(2)	[F20-OP2.1]
	[F20-OS2.1]
(3)	[F20-OP2.1]
	[F20-OS2.1]
(4)	[F20-OP2.1]
	[F20-OS2.1]
(5)	[F20-OP2.1]
	[F20-OS2.1]
(6)	[F20-OP2.1]
	[F20-OS2.1]
(7)	[F20-OP2.1]

Acceptable Solution	Objectives and Functional Statements
	[F20-OS2.1]
(8)	[F20-OP2.1]
	[F20-OS2.1]
9.23.9.1.	**End Bearing for Joists**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1]
(2)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1]
9.23.9.2.	**Joists Supported by Beams**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(3)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4]
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.

Acceptable Solution	Objectives and Functional Statements
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(4)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(5)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.23.9.3.	**Restraint of Joist Bottoms**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.23.9.4.	**Strapping and Bridging in Tables A-1 and A-2**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.

Acceptable Solution	Objectives and Functional Statements
	[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(3)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(4)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(5)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(6)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.

Acceptable Solution	Objectives and Functional Statements
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.23.9.5.	**Header Joists**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	
9.23.9.6.	**Trimmer Joists**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	
9.23.9.7.	**Support of Tail and Header Joists**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.23.9.8.	**Support of Walls**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.

Acceptable Solution	Objectives and Functional Statements
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(3)	
(4)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(5)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.23.9.9.	**Cantilevered Floor Joists**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.

Acceptable Solution	Objectives and Functional Statements
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(3)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.23.10.1.	**Stud Size and Spacing**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.

Acceptable Solution	Objectives and Functional Statements
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.23.10.2.	**Bracing and Lateral Support**
(1)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.4, OP2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OH4] Applies to walls that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.4, OS2.5]
	[F22-OS3.1] Applies to walls that support floors. [F22-OS3.7] Applies to walls that contain doors or windows required for emergency egress.
(2)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.4, OP2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OH4] Applies to walls that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.4, OS2.5]
	[F22-OS3.1] Applies to walls that support floors. [F22-OS3.7] Applies to walls that contain doors or windows required for emergency egress.
(3)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.4, OP2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OH4] Applies to walls that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.4, OS2.5]
	[F22-OS3.1] Applies to walls that support floors. [F22-OS3.7] Applies to walls that contain doors or windows required for emergency egress.
(4)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.4, OP2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OH4] Applies to walls that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.4, OS2.5]
	[F22-OS3.1] Applies to walls that support floors. [F22-OS3.7] Applies to walls that contain doors or windows required for emergency egress.
(5)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to walls that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to walls that support of are part of an environmental separator.
	[F22-OH4] Applies to walls that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to walls that support or are part of an environmental separator.
	[F22-OS3.1] Applies to walls that support floors. [F22-OS3.7] Applies to walls that contain doors or windows required for emergency egress.
9.23.10.3.	**Orientation of Studs**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.

Acceptable Solution	Objectives and Functional Statements
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	
(3)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.23.10.4.	**Continuity of Studs**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.23.10.5.	**Support for Cladding Materials**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.

Acceptable Solution	Objectives and Functional Statements
9.23.10.6.	**Studs at Sides of Openings**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	
9.23.10.7.	**Stud Posts Built into Walls**
(1)	
(2)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(3)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and roofs and elements that support floors and roofs.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and roofs and elements that support floors and roofs. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.23.11.1.	**Size of Wall Plates**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.

Acceptable Solution	Objectives and Functional Statements
(2)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.23.11.2.	**Bottom Wall Plates**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.4, OP2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.5]
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.23.11.3.	**Top Plates**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.

Acceptable Solution	Objectives and Functional Statements
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(3)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(4)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.23.11.4.	**Joints in Top Plates**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.

Acceptable Solution	Objectives and Functional Statements
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(3)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(4)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.23.12.1.	**Openings in Non-Loadbearing Walls**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	[F20, F22-OS1.2]
9.23.12.2.	**Openings in Loadbearing Walls**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.

Acceptable Solution	Objectives and Functional Statements
(2)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(3)	
9.23.12.3.	**Lintel Spans and Sizes**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(3)	[F20-OP2.1, OP2.5] [F22-OP2.4, OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.23.13.1.	**Continuity of Rafters and Joists**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.

Acceptable Solution	Objectives and Functional Statements
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
9.23.13.2.	**Framing around Openings**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
9.23.13.3.	**End Bearing Length**
(1)	[F20-OP2.1, OP2.5] [F22-OP2.5] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1, OS2.5] [F22-OS2.5] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
9.23.13.4.	**Location and Attachment of Rafters**
(1)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.5]
(2)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.5]
(3)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.5]
9.23.13.5.	**Shaping of Rafters**
(1)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.5]
9.23.13.6.	**Hip and Valley Rafters**
(1)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.5]
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
9.23.13.7.	**Intermediate Support for Rafters and Joists**
(1)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.5]
(2)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.5]
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.5]

Acceptable Solution	Objectives and Functional Statements
(3)	
(4)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.5]
(5)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.5]
(6)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.4, OP2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F22-OH4]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.5]
9.23.13.8.	**Ridge Support**
(1)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.4, OP2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.5]
	[F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	
(3)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.4, OP2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.5]
	[F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(4)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.4, OP2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.5]
	[F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(5)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.4, OP2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.5]
	[F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(6)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.4, OP2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.5]
	[F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(7)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.4, OP2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.

Acceptable Solution	Objectives and Functional Statements
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.5]
	[F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.23.13.9.	**Restraint of Joist Bottoms**
(1)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.5]
9.23.13.10.	**Ceiling Joists Supporting Roof Load**
(1)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.5]
(2)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.5]
9.23.13.11.	**Wood Roof Trusses**
(1)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.4, OP2.5]
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.5]
	(b) [F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	(b) [F20, F22-OH1.1, OH1.2, OH1.3]
(2)	
(3)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.4, OP2.5]
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.4, OS2.5]
(4)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.4, OP2.5]
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.4, OS2.5]
(5)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.4, OP2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.4, OS2.5]
(6)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.4, OP2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.4, OS2.5]
9.23.14.1.	**Subflooring Required**
(1)	[F20-OS2.1]
9.23.14.2.	**Material Standards**
(1)	[F22-OH4]
	[F22-OP2.4]
	[F20-OS2.1]
	[F22-OS3.1]
(2)	[F80-OH4]
	[F80-OP2.4]
	[F80-OS2.1]
	[F80-OS3.1]
(3)	[F22-OH4]
	[F22-OP2.4]
	[F20-OS2.1]
	[F22-OS3.1]
(4)	[F80-OH4]

Acceptable Solution	Objectives and Functional Statements
	[F80-OP2.4]
	[F80-OS2.1]
	[F80-OS3.1]
9.23.14.3.	**Edge Support**
(1)	[F22-OH4]
	[F22-OP2.4]
	[F22-OS3.1]
9.23.14.4.	**Direction of Installation**
(1)	[F22-OH4]
	[F22-OP2.4]
	[F22-OS3.1]
(2)	[F22-OH4]
	[F22-OP2.4]
	[F22-OS3.1]
9.23.14.5.	**Subfloor Thickness or Rating**
(1)	[F22-OH4]
	[F22-OP2.4]
	[F20-OS2.1]
	[F22-OS3.1]
(2)	[F22-OH4]
	[F22-OP2.4]
	[F20-OS2.1]
	[F22-OS3.1]
(3)	[F22-OH4]
	[F22-OP2.4]
	[F20-OS2.1]
	[F22-OS3.1]
9.23.14.6.	**Annular Grooved Nails**
(1)	[F81-OH1.1]
	[F81-OP2.3]
	[F81-OS2.3]
9.23.14.7.	**Lumber Subflooring**
(1)	[F22-OH4]
	[F22-OP2.4]
	[F22-OS3.1]
(2)	[F22-OH4]
	[F22-OP2.4]
	[F22-OS3.1]
(3)	[F22-OP2.4]
	[F22-OS3.1]
9.23.15.1.	**Required Roof Sheathing**
(1)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.4, OP2.5]
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.4, OS2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
9.23.15.2.	**Material Standards**
(1)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.4, OP2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.4, OS2.5]
9.23.15.3.	**Direction of Installation**
(1)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.4, OP2.5]

Acceptable Solution	Objectives and Functional Statements
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.4, OS2.5]
(2)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.4, OP2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.4, OS2.5]
9.23.15.4.	**Joints in Panel-Type Sheathing**
(1)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.4, OP2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.4, OS2.5]
(2)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.4, OP2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.4, OS2.5]
9.23.15.5.	**Lumber Roof Sheathing**
(1)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.4, OP2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.4, OS2.5]
9.23.15.6.	**Edge Support**
(1)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.4, OP2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.4, OS2.5]
(2)	
9.23.15.7.	**Thickness or Rating**
(1)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.4, OP2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F22-OH4]
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.5]
	[F22-OS3.1]
(2)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.4, OP2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.5]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
(3)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.4, OP2.5]
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
(4)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.4, OP2.5]
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
9.23.16.1.	**Required Sheathing**
(1)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.4, OP2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.5]
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.

Acceptable Solution	Objectives and Functional Statements
9.23.16.2.	**Thickness, Rating and Material Standards**
(1)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.4, OP2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.5]
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
9.23.16.3.	**Attachment of Cladding to Sheathing**
(1)	
(2)	[F20, F22, F80-OH1.1, OH1.2, OH1.3]
	[F20, F22, F80-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22, F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20, F22, F80-OS2.1] Applies to elements that support or are part of an environmental separator.
	[F22, F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.23.16.4.	**Lumber Sheathing**
(1)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.4, OP2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.5]
	[F20, F22-OS3.1] Applies to floors and elements that support floors.
(2)	[F20-OP2.1, OP2.3, OP2.5] [F22-OP2.3, OP2.4, OP2.5]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OH4] Applies to floors and elements that support floors.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.3, OS2.5] [F22-OS2.3, OS2.5]
	[F22-OS3.1] Applies to floors and elements that support walls. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.23.16.5.	**Joints in Panel-Type Sheathing**
(1)	[F80, F81-OH1.1, OH1.2, OH1.3]
	[F80, F81-OH4] Applies to floors and elements that support floors.
	[F80, F81-OP2.3, OP2.4]
	[F80, F81-OS2.3]
	[F80, F81-OS3.1] Applies to floors and elements that support floors.
9.23.16.6.	**Mansard Style Roofs**
(1)	
9.24.1.1.	**Application**
(1)	
(2)	
9.24.1.2.	**Material Standards**
(1)	[F20, F22, F80-OH1.1, OH1.2, OH1.3]
	[F20-OP2.1, OP2.4] [F22, F80-OP2.4] [F20, F22, F80-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1, OS2.4] [F22, F80-OS2.4] [F20, F22, F80-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22, F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22, F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.

Acceptable Solution	Objectives and Functional Statements
9.24.1.3.	**Metal Thickness**
(1)	
9.24.1.4.	**Screws**
(1)	[F20, F22, F80-OH1.1, OH1.2, OH1.3]
	[F20-OP2.1, OP2.4] [F22, F80-OP2.4] [F20, F22, F80-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22, F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.4] [F22, F80-OS2.4] [F20, F22, F80-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22, F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.24.1.5.	**Cladding, Sheathing and Interior Finish Required**
(1)	[F20, F22, F80-OH1.1, OH1.2, OH1.3]
	[F20, F22, F80-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22, F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20, F22, F80-OS2.1] Applies to elements that support or are part of an environmental separator.
	[F22, F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.24.2.1.	**Size and Spacing of Studs in Interior Walls**
(1)	[F20-OP2.1, OP2.4] [F22-OP2.4]
	[F20-OS2.1, OS2.4] [F22-OS2.4]
	[F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.24.2.2.	**Thickness of Studs**
(1)	[F20-OP2.1, OP2.4] [F22-OP2.4]
	[F20-OS2.1, OS2.4] [F22-OS2.4]
	[F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.24.2.3.	**Runners**
(1)	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20-OP2.1, OP2.4] [F22-OP2.4] [F20, F22-OP2.3] Applies to elements that support or are a part of an environmental separator.
	[F20-OS2.1, OS2.4] [F22-OS2.4] [F20, F22-OS2.3] Applies to elements that support or are a part of an environmental separator.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
9.24.2.4.	**Openings in Fire Separations**
(1)	[F20-OS1.2]
(2)	[F20-OS1.2]
(3)	[F20-OS1.2]
(4)	[F03, F20-OS1.2]
9.24.2.5.	**Size and Spacing of Studs in Exterior Walls**
(1)	[F20-OP2.1, OP2.3, OP2.4] [F22-OP2.3, OP2.4]
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.3, OS2.4] [F22-OS2.3, OS2.4]
	[F22, F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.24.3.1.	**Installation of Runners**
(1)	[F20, F22-OH1.1, OH1.2, OH1.3]

Acceptable Solution	Objectives and Functional Statements
	[F20-OP2.1, OP2.4] [F22-OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.4] [F22-OS2.4] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22, F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20-OP2.1, OP2.4] [F22-OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1, OS2.4] [F22-OS2.4] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22, F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(3)	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20-OP2.1, OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.4] [F22-OS2.4] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22, F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(4)	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20-OP2.1, OP2.4] [F22-OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.4] [F22-OS2.4] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22, F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.24.3.2.	**Fire-Rated Walls**
(1)	[F21-OS1.2]
(2)	[F21-OS1.2]
(3)	[F20-OS1.2]
(4)	[F20-OS1.2]
9.24.3.3.	**Orientation of Studs**
(1)	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20-OP2.1, OP2.4] [F22-OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.4] [F22-OS2.4] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22, F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.

Acceptable Solution	Objectives and Functional Statements
9.24.3.4.	**Support for Cladding Materials**
(1)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OP2.1, OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.4] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.24.3.5.	**Framing around Openings**
(1)	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20-OP2.1, OP2.4] [F22-OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1, OS2.4] [F22-OS2.4] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22, F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20-OP2.1, OP2.4] [F22-OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1, OS2.4] [F22-OS2.4] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22, F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
9.24.3.6.	**Attachment of Studs to Runners**
(1)	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20-OP2.1, OP2.4] [F22-OP2.4] [F20, F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1, OS2.4] [F22-OS2.4] [F20, F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22, F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	[F21-OS1.2]
9.24.3.7.	**Openings for Fire Dampers**
(1)	[F20-OS1.2]
(2)	[F20-OS1.2]
(3)	[F03-OS1.2]
9.25.1.1.	**Application**
(1)	
(2)	
9.25.1.2.	**General**
(1)	
(2)	[F62, F63-OH1.1, OH1.2]
	[F62, F63-OS2.3]

Acceptable Solution	Objectives and Functional Statements
(3)	
(4)	
(5)	
(6)	
(7)	
9.25.2.1.	**Required Insulation**
(1)	[F51, F63-OH1.1, OH1.2]
	[F63-OS2.3]
9.25.2.2.	**Insulation Materials**
(1)	[F51, F63, F80-OH1.1, OH1.2]
	[F63, F80-OS2.3]
(2)	
(3)	[F51, F63-OH1.1, OH1.2]
	[F63-OS2.3]
(4)	[F51, F63, F80-OH1.1, OH1.2]
	[F63, F80-OS2.3]
9.25.2.3.	**Installation of Thermal Insulation**
(1)	[F51, F63-OH1.1, OH1.2]
	[F63-OS2.3]
(2)	[F51, F63-OH1.1, OH1.2]
	[F63-OS2.3]
(3)	[F55-OH1.1, OH1.2]
	[F55-OS2.3]
(4)	[F51, F63, F80-OH1.1, OH1.2]
	[F63, F80-OS2.3]
(5)	[F21-OH1.1, OH1.2, OH1.3]
	[F21-OS2.2, OS2.3]
(6)	[F80-OH1.1, OH1.2]
	[F80-OS2.3]
(7)	[F80-OH1.1, OH1.2]
	[F80-OS2.3]
(8)	
(9)	[F21-OH1.1, OH1.2]
	[F21-OS2.3]
9.25.2.4.	**Installation of Loose-Fill Insulation**
(1)	[F51, F63-OH1.1, OH1.2]
	[F63-OS2.3]
(2)	[F51-OH1.1, OH1.2, OH1.3]
	[F51-OS2.3]
(3)	
(4)	(a) [F21, F51-OH1.1, OH1.2]
	(a) [F21, F51-OS2.3]
	(c) [F81-OH1.1, OH1.2] (c) [F81-OH1.1, OH1.2, OH1.3] Applies where the interior finish provide the required bracing
	(c) [F81-OH4] Applies where the interior finish provides the required bracing of walls that support floors
	(c) [F81-OP2.1, OP2.3, OP2.4, OP2.5] Applies where the interior finish provides the required bracing
	(c) [F81-OP3.1] Applies where the interior finish contributes to the required fire resistance of the wall
	(c) [F81-OS2.1, OS2.3] (c) [F81-OS2.1, OS2.3, OS2.4, OS2.5] Applies where the interior finish provides the required bracing
	(c) [F81-OS3.7] Applies where the interior finish provides the required bracing (c) [F81-OS3.1] Applies where the interior finish provides the required bracing of walls that support floors
	(d) [F80-OH1.1, OH1.2, OH1.3]

Acceptable Solution	Objectives and Functional Statements
	(d) [F80-OS2.3]
(5)	[F51, F63-OH1.1, OH1.2]
	[F63-OS2.3]
(6)	(a) [F51, F62-OH1.1, OH1.2, OH1.3]
	(a) [F62, F51-OS2.3]
	(b) [F51, F63-OH1.1, OH1.2]
	(b) [F51, F63-OS2.3]
9.25.2.5.	**Installation of Spray-applied Polyurethane**
(1)	[F41, F51, F63-OH1.1] [F51, F63-OH1.2]
	[F63-OS2.3]
9.25.3.1.	**Required Barrier to Air Leakage**
(1)	[F55-OH1.1, OH1.2, OH1.3]
	[F44-OS1.1] Applies where the *air barrier system* separates a garage, or *suite* containing a garage, from residential space.
	[F55-OS2.3]
	[F44-OS3.4] Applies where the *air barrier system* separates a garage, or *suite* containing a garage, from residential space.
9.25.3.2.	**Air Barrier System Properties**
(1)	[F20, F55-OH1.1, OH1.2, OH1.3]
	[F20, F44-OS1.1] Applies where the *air barrier system* separates a garage, or *suite* containing a garage, from residential space.
	[F55-OS2.3]
	[F20, F44-OS3.4] Applies where the *air barrier system* separates a garage, or *suite* containing a garage, from residential space.
(2)	[F20, F55-OH1.1, OH1.2, OH1.3]
	[F20, F44-OS1.1] Applies where the *air barrier system* separates a garage, or *suite* containing a garage, from residential space.
	[F55-OS2.3]
	[F20, F44-OS3.4] Applies where the *air barrier system* separates a garage, or *suite* containing a garage, from residential space.
9.25.3.3.	**Continuity of the Air Barrier System**
(1)	[F55-OH1.1, OH1.2, OH1.3]
	[F44-OS1.1] Applies where the *air barrier system* separates a garage, or *suite* containing a garage, from residential space.
	[F55-OS2.3]
	[F44-OS3.4] Applies where the *air barrier system* separates a garage, or *suite* containing a garage, from residential space.
(2)	[F55-OH1.1, OH1.2, OH1.3]
	[F55-OS2.3]
	(a) [F44-OS1.1] Applies where the *air barrier system* separates a garage, or *suite* containing a garage, from residential space.
	(a) [F44-OS3.4] Applies where the *air barrier system* separates a garage, or *suite* containing a garage, from residential space.
(3)	
(4)	
(5)	
(6)	[F55-OH1.1, OH1.2, OH1.3]
	[F44-OS1.1] Applies where the *air barrier system* separates a garage, or *suite* containing a garage, from residential space.
	[F55-OS2.3]
	[F44-OS3.4] Applies where the *air barrier system* separates a garage, or *suite* containing a garage, from residential space.

Acceptable Solution	Objectives and Functional Statements
(7)	[F55-OH1.1, OH1.2, OH1.3]
	[F55-OS2.3]
(8)	[F01-OS1.1]
9.25.4.1.	**Required Barrier to Vapour Diffusion**
(1)	[F63-OH1.1, OH1.2]
	[F63-OS2.3]
9.25.4.2.	**Vapour Barrier Materials**
(1)	[F63-OH1.1, OH1.2]
	[F63-OS2.3]
(2)	
(3)	
(4)	[F63, F80-OH1.1, OH1.2]
	[F63, F80-OS2.3]
(5)	[F63, F80-OH1.1, OH1.2]
	[F63, F80-OS2.3]
(6)	[F63-OH1.1, OH1.2]
	[F63-OS2.3]
9.25.4.3.	**Installation of Vapour Barriers**
(1)	[F63-OH1.1, OH1.2]
	[F63-OS2.3]
(2)	[F63-OH1.1, OH1.2]
	[F63-OS2.3]
9.26.1.1.	**Purpose of Roofing**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(2)	
9.26.1.2.	**Alternate Installation Methods**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.26.1.3.	**Solar Collector Systems**
(1)	
9.26.2.1.	**Material Standards**
(1)	[F63-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.26.2.2.	**Nails**
(1)	[F20, F80-OH1.1, OH1.2, OH1.3]
	[F20, F80-OS2.3]
(2)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OS2.3]
(3)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OS2.3]
(4)	[F20, F80-OH1.1, OH1.2, OH1.3]
	[F20, F80-OS2.3]
9.26.2.3.	**Staples**
(1)	[F20, F80-OH1.1, OH1.2, OH1.3]
	[F20, F80-OS2.3]
(2)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OS2.3]
(3)	[F20, F80-OH1.1, OH1.2, OH1.3]
	[F20, F80-OS2.3]
9.26.3.1.	**Slope**

Acceptable Solution	Objectives and Functional Statements
(1)	[F20, F61, F80-OH1.1, OH1.2, OH1.3]
	[F20-OS2.1, OS2.3] [F61, F80-OS2.3]
(2)	[F20, F61, F80-OH1.1, OH1.2, OH1.3]
	[F20, F61, F80-OS2.3]
(3)	[F61, F80-OH1.1, OH1.2, OH1.3]
	[F61, F80-OS2.3]
(4)	[F61, F80-OH1.1, OH1.2, OH1.3]
	[F61, F80-OS2.3]
(5)	[F21-OH1.1, OH1.2, OH1.3]
	[F21-OS2.3]
9.26.4.1.	**Required Flashing at Intersections**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(2)	
9.26.4.2.	**Materials**
(1)	[F61, F62, F80-OH1.1, OH1.2, OH1.3]
	[F61, F62, F80-OS2.3]
9.26.4.3.	**Valley Flashing**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(2)	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20-OS2.1, OS2.3] [F22-OS2.3, OS2.4]
(3)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(4)	[F20, F61, F80-OH1.1, OH1.2, OH1.3]
	[F20, F61, F80-OS2.3]
(5)	[F20, F61, F80-OH1.1, OH1.2, OH1.3]
	[F20, F61, F80-OS2.3]
(6)	[F20, F61, F80-OH1.1, OH1.2, OH1.3]
	[F20, F61, F80-OS2.3]
(7)	[F20, F61, F80-OH1.1, OH1.2, OH1.3]
	[F20, F61, F80-OS2.3]
9.26.4.4.	**Intersection of Shingle Roofs and Masonry**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OP1.1] Applies where a shingle roof intersects with a masonry *chimney*.
	[F61-OS1.1] Applies where a shingle roof intersects with a masonry *chimney*.
	[F61-OS2.3]
	[F61-OS3.4] Applies where a shingle roof intersects with a masonry *chimney*.
(2)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OP1.1] Applies where counter flashing is installed between a shingle roof and a masonry *chimney*.
	[F61-OS1.1] Applies where counter flashing is installed between a shingle roof and a masonry *chimney*.
	[F61-OS2.3]
	[F61-OS3.4] Applies where counter flashing is installed between a shingle roof and a masonry *chimney*.
(3)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OP1.1] Applies where flashing is installed between a shingle roof and a masonry *chimney*.
	[F61-OS1.1] Applies where flashing is installed between a shingle roof and a masonry *chimney*.
	[F61-OS2.3]
	[F61-OS3.4] Applies where flashing is installed between a shingle roof and a masonry *chimney*.
(4)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OP1.1] Applies where a shingle roof slopes upward from a masonry *chimney*.
	[F61-OS1.1] Applies where a shingle roof slopes upward from a masonry *chimney*.

Acceptable Solution	Objectives and Functional Statements
	[F61-OS2.3]
	[F61-OS3.4] Applies where a shingle roof slopes upward from a masonry *chimney*.
9.26.4.5.	**Intersection of Shingle Roofs and Walls Other Than Masonry**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(2)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(3)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.26.4.6.	**Intersection of Built-Up Roofs and Masonry**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OP1.1] Applies where a built-up roof intersects with a masonry *chimney*.
	[F61-OS1.1] Applies where a built-up roof intersects with a masonry *chimney*.
	[F61-OS2.3]
	[F61-OS3.4] Applies where a built-up roof intersects with a masonry *chimney*.
(2)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OP1.1] Applies where counter flashing is installed between a built-up roof and a masonry *chimney*.
	[F61-OS1.1] Applies where counter flashing is installed between a built-up roof and a masonry *chimney*.
	[F61-OS2.3]
	[F61-OS3.4] Applies where counter flashing is installed between a built-up roof and a masonry *chimney*.
9.26.4.7.	**Intersection of Built-Up Roofs and Walls other than Masonry**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(2)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(3)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.26.4.8.	**Chimney Saddles**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OP1.1]
	[F61-OS1.1]
	[F61-OS2.3]
	[F61-OS3.4]
(2)	[F20, F80-OH1.1, OH1.2, OH1.3]
	[F20, F80-OP1.1]
	[F20, F80-OS1.1]
	[F20, F80-OS2.3]
	[F20, F80-OS3.4]
(3)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(4)	
(5)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OP1.1]
	[F61-OS1.1]
	[F61-OS2.3]
	[F61-OS3.4]
(6)	
9.26.5.1.	**Required Eave Protection**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(2)	

Acceptable Solution	Objectives and Functional Statements
9.26.5.2.	**Materials**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.26.6.1.	**Materials**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(2)	[F62-OH1.1, OH1.2, OH1.3]
	[F62-OS2.3]
9.26.6.2.	**Installation**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(2)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(3)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.26.7.1.	**Coverage**
(1)	[F61, F80-OH1.1, OH1.2, OH1.3]
	[F61, F80-OS2.1]
9.26.7.2.	**Starter Strip**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(2)	[F61, F80-OH1.1, OH1.2, OH1.3]
	[F61, F80-OS2.3]
(3)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.26.7.3.	**Head Lap**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.26.7.4.	**Fasteners**
(1)	[F20, F61-OH1.1, OH1.2, OH1.3]
	[F20, F61-OS2.3]
(2)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OS2.3]
(3)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OS2.3]
(4)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OS2.3]
(5)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OS2.3]
9.26.7.5.	**Securing of Tabs**
(1)	[F20, F61-OH1.1, OH1.2, OH1.3]
	[F20, F61-OS2.3]
9.26.7.6.	**Hips and Ridges**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(2)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OS2.3]
9.26.7.7.	**Eave Protection**
(1)	
9.26.7.8.	**Flashing**
(1)	

Acceptable Solution	Objectives and Functional Statements
9.26.8.1.	**Coverage**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.26.8.2.	**Starter Strip**
(1)	
(2)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.26.8.3.	**Securing of Tabs**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.26.8.4.	**Securing of Shingle Courses**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(2)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(3)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.26.8.5.	**Hips and Ridges**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(2)	[F61, F80-OH1.1, OH1.2, OH1.3]
	[F61, F80-OS2.3]
9.26.8.6.	**Flashing**
(1)	
9.26.8.7.	**Fastening**
(1)	
9.26.9.1.	**Decking**
(1)	
9.26.9.2.	**Grade**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(2)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.26.9.3.	**Size**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.26.9.4.	**Spacing and Joints**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.26.9.5.	**Fastening**
(1)	[F20, F80-OH1.1, OH1.2, OH1.3]
	[F20, F80-OS2.3]
9.26.9.6.	**Exposure**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.26.9.7.	**Flashing**
(1)	
9.26.9.8.	**Eave Protection**
(1)	
9.26.10.1.	**Size and Thickness**
(1)	[F61-OH1.1, OH1.2, OH1.3]

Acceptable Solution	Objectives and Functional Statements
	[F61-OS2.3]
9.26.10.2.	**Underlay**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(2)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(3)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.26.10.3.	**Spacing and Joints**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.26.10.4.	**Fastening**
(1)	[F20, F80-OH1.1, OH1.2, OH1.3]
	[F20, F80-OS2.3]
9.26.10.5.	**Exposure**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.26.10.6.	**Flashing**
(1)	
9.26.10.7.	**Eave Protection**
(1)	
9.26.10.8.	**Grade**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.26.11.1.	**Quantity of Materials**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.26.11.2.	**Coal-Tar and Asphalt Products**
(1)	[F61, F80-OH1.1, OH1.2, OH1.3]
	[F61, F80-OS2.3]
9.26.11.3.	**Roof Felts**
(1)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OS2.3]
9.26.11.4.	**Aggregate Surfacing**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(2)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.26.11.5.	**Flashing**
(1)	
9.26.11.6.	**Number of Layers**
(1)	[F20, F80-OH1.1, OH1.2, OH1.3]
	[F20, F80-OS2.3]
9.26.11.7.	**Installation of Layers**
(1)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OS2.3]
(2)	[F61, F81-OH1.1, OH1.2, OH1.3]
	[F61, F81-OS2.3]
(3)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OS2.3]
9.26.11.8.	**Roofing over Wood-Based Sheathing**

Acceptable Solution	Objectives and Functional Statements
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(2)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.26.11.9.	**Attachment to Decking**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.26.11.10.	**Cant Strips**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
	[F61-OS3.1]
(2)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(3)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(4)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
	[F61-OS3.1]
(5)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(6)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.26.12.1.	**Double Coverage**
(1)	[F61, F80-OH1.1, OH1.2, OH1.3]
	[F61, F80-OS2.3]
9.26.12.2.	**Joints**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.26.13.1.	**Thickness**
(1)	[F61, F80-OH1.1, OH1.2, OH1.3]
	[F61, F80-OS2.3]
9.26.13.2.	**Support**
(1)	[F20-OP2.1, OP2.3] [F22-OP2.3, OP2.4]
	[F20-OS2.1, OS2.3] [F22-OS2.3, OS2.4]
	[F20, F22-OH1.1, OH1.2, OH1.3]
9.26.14.1.	**Support**
(1)	[F20-OS2.1, OS2.3] [F22-OS2.3, OS2.4]
	[F20, F22-OH1.1, OH1.2, OH1.3]
9.26.15.1.	**Installation**
(1)	[F61, F80-OH1.1, OH1.2, OH1.3]
	[F61, F80-OS2.3]
9.26.16.1.	**Installation**
(1)	[F61, F80-OH1.1, OH1.2, OH1.3]
	[F61, F80-OS2.3]
9.26.17.1.	**Installation**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.26.18.1.	**Roof Drains**
(1)	
9.26.18.2.	**Downspouts**
(1)	[F61-OH1.1, OH1.2, OH1.3]

Acceptable Solution	Objectives and Functional Statements
	[F61-OS2.3]
9.27.1.1.	**General**
(1)	
(2)	
(3)	
(4)	
(5)	
9.27.2.1.	**Minimizing and Preventing Ingress and Damage**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(2)	[F80, F81-OH1.1, OH1.2, OH1.3]
	[F80, F81-OS2.3]
9.27.2.2.	**Minimum Protection from Precipitation Ingress**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.27.2.3.	**First and Second Planes of Protection**
(1)	[F61, F62-OH1.1, OH1.2, OH1.3]
	[F61, F62-OS2.3]
9.27.2.4.	**Protection of Cladding from Moisture**
(1)	[F61, F80-OH1.1, OH1.2, OH1.3]
	[F61, F80-OS2.3]
(2)	[F61-OH1.1, OH1.2, OH1.3]
	[F61, F80-OS2.3]
9.27.3.1.	**Elements of the Second Plane of Protection**
(1)	[F61, F62-OH1.1, OH1.2, OH1.3]
	[F61, F62-OS2.3]
(2)	
(3)	[F61, F62-OH1.1, OH1.2, OH1.3]
	[F61, F62-OS2.3]
(4)	
9.27.3.2.	**Sheathing Membrane Material Standard**
(1)	[F20, F55, F61, F62-OH1.1, OH1.2, OH1.3]
	[F20, F55, F61, F62-OS2.3]
9.27.3.3.	**Required Sheathing Membrane and Installation**
(1)	[F55, F61-OH1.1, OH1.2, OH1.3]
	[F55, F61-OS2.3]
(2)	[F55, F61-OH1.1, OH1.2, OH1.3]
	[F55, F61-OS2.3]
(3)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.27.3.4.	**Insulating Sheathing in Lieu of Sheathing Membrane**
(1)	
(2)	[F55, F61-OH1.1, OH1.2, OH1.3]
	[F55, F61-OS2.3]
9.27.3.5.	**Sheathing Membranes in Lieu of Sheathing**
(1)	[F55, F61-OH1.1, OH1.2, OH1.3]
	[F55, F61-OS2.3]
(2)	[F55, F61-OH1.1, OH1.2, OH1.3]
	[F55, F61-OS2.3]
(3)	
9.27.3.6.	**Face Sealed Cladding**

Acceptable Solution	Objectives and Functional Statements
(1)	
(2)	[F20, F55, F61-OH1.1, OH1.2, OH1.3]
	[F20, F55, F61-OS2.3]
(3)	[F55, F61-OH1.1, OH1.2, OH1.3]
	[F55, F61-OS2.3]
9.27.3.7.	**Flashing Materials**
(1)	[F61, F62, F80-OH1.1, OH1.2, OH1.3]
	[F61, F62, F80-OS2.3]
9.27.3.8.	**Flashing Installation**
(1)	(a), (b), (c)(i) [F61-OH1.1, OH1.2, OH1.3]
	(a), (b), (c)(i) [F61-OS2.3]
	(c)(ii) [F61, F62-OH1.1, OH1.2, OH1.3]
	(c)(ii) [F61, F62-OS2.3]
(2)	(a), (b)(ii), (c)(i) [F61-OH1.1, OH1.2, OH1.3] Applies to detailing of horizontal joints.
	(a), (b)(ii), (c)(i) [F61-OS2.3] Applies to detailing of horizontal joints.
	(b)(i), (c)(ii) [F61, F62-OH1.1, OH1.2, OH1.3] Applies to cladding installed outboard of a drained and vented air space.
	(b)(i), (c)(ii) [F61, F62-OS2.3] Applies to cladding installed outboard of a drained and vented air space.
(3)	[F61, F62-OH1.1, OH1.2, OH1.3]
	[F61, F62-OS2.3]
(4)	[F61, F62-OH1.1, OH1.2, OH1.3]
	[F61, F62-OS2.3]
(5)	[F61, F62-OH1.1, OH1.2, OH1.3]
	[F61, F62-OS2.3]
(6)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.27.4.1.	**Required Caulking**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(2)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(3)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.27.4.2.	**Materials**
(1)	[F80-OH1.1, OH1.2, OH1.3]
	[F80-OS2.3]
(2)	[F80-OH1.1, OH1.2, OH1.3]
	[F80-OS2.3]
9.27.5.1.	**Attachment**
(1)	[F20-OH1.1, OH1.2, OH1.3] [F20, F22-OH1.1, OH1.2, OH1.3] Applies where panel-type cladding is installed to provide the required bracing.
	[F20-OP2.1, OP2.3, OP2.4] [F22-OP2.3, OP2.4, OP2.5] Applies where panel-type cladding is installed to provide the required bracing.
	[F20-OS2.1, OS2.3] [F20-OS2.1, OS2.3, OS2.4] [F22-OS2.3, OS2.4, OS2.5] Applies where panel-type cladding is installed to provide the required bracing.
	[F20, F22-OH4.1] Applies where panel-type cladding is installed to provide the required bracing of walls that support floors.
	[F20, F22-OS3.1] Applies where panel-type cladding is installed to provide the required bracing of walls that support floors. [F20, F22-OS3.7] Applies where panel-type cladding is installed to provide bracing of walls that contain doors or windows required for emergency egress.

Acceptable Solution	Objectives and Functional Statements
(2)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OS2.1, OS2.3]
(3)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OS2.3]
(4)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OS2.1, OS2.3]
(5)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OS2.1, OS2.3]
(6)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OS2.1, OS2.3]
(7)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OS2.1, OS2.3]
9.27.5.2.	**Blocking**
(1)	[F20-OH1.1, OH1.2, OH1.3] [F20, F22-OH1.1, OH1.2, OH1.3] Applies where panel-type cladding is installed to provide the required bracing.
	[F20-OP2.1, OP2.3, OP2.4] [F22-OP2.3, OP2.4, OP2.5] Applies where panel-type cladding is installed to provide the required bracing.
	[F20-OS2.1, OS2.3] [F20-OS2.1, OS2.3, OS2.4] [F22-OS2.3, OS2.4, OS2.5] Applies where panel-type cladding is installed to provide the required bracing.
9.27.5.3.	**Furring**
(1)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OS2.1, OS2.3] [F20-OS2.1, OS2.3, OS2.4] [F22-OS2.3, OS2.4, OS2.5] Applies where furring is used for the attachment if panel-type cladding installed to provide the required bracing.
(2)	[F20-OH1.1, OH1.2, OH1.3] [F20, F22-OH1.1, OH1.2, OH1.3] Applies where furring is used for the attachment of panel-type cladding installed to provide the required bracing.
	[F20-OS2.1, OS2.3] [F20-OS2.1, OS2.3, OS2.4] [F22-OS2.3, OS2.4, OS2.5] Applies where furring is used for the attachment of panel-type cladding installed to provide the required bracing.
(3)	[F20-OH1.1, OH1.2, OH1.3] [F20, F22-OH1.1, OH1.2, OH1.3] Applies where furring is used for the attachment of panel-type cladding installed to provide the required bracing.
	[F20-OS2.1, OS2.3] [F20-OS2.1, OS2.3, OS2.4] [F22-OS2.3, OS2.4, OS2.5] Applies where furring is used for the attachment of panel-type cladding installed to provide the required bracing.
9.27.5.4.	**Size and Spacing of Fasteners**
(1)	[F20-OH1.1, OH1.2, OH1.3] [F20, F22-OH1.1, OH1.2, OH1.3] Applies to the attachment of panel-type cladding installed to provide the required bracing.
	[F20-OS2.1, OS2.3] [F20-OS2.1, OS2.3, OS2.4] [F22-OS2.3, OS2.4, OS2.5] Applies where panel-type cladding is installed to provide the required bracing.
9.27.5.5.	**Fastener Materials**
(1)	[F80-OH1.1, OH1.2, OH1.3]
	[F80-OP2.1, OP2.3, OP2.4, OP2.5] Applies where panel-type cladding is installed to provide the required bracing.
	[F80-OS2.3] [F80-OS2.3, OS2.4] Applies where panel-type cladding is installed to provide required bracing.
9.27.5.6.	**Expansion and Contraction**
(1)	[F21-OH1.1, OH1.2, OH1.3]
	[F21-OS2.3]
9.27.5.7.	**Penetration of Fasteners**
(1)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OS2.1, OS2.3]

Acceptable Solution	Objectives and Functional Statements
(2)	[F20-OH1.1, OH1.2, OH1.3] [F20, F22-OH1.1, OH1.2, OH1.3] Applies where panel-type cladding is installed to provide the required bracing.
	[F20-OP2.1, OP2.3, OP2.4] [F22-OP2.3, OP2.4, OP2.5] Applies where panel-type cladding is installed to provide the required bracing.
	[F20-OS2.1, OS2.3] [F20-OS2.1, OS2.3, OS2.4] [F22-OS2.3, OS2.4, OS2.5] Applies where panel-type cladding is installed to provide the required bracing.
9.27.6.1.	**Materials**
(1)	[F20, F61-OH1.1, OH1.2, OH1.3]
	[F20, F62-OS2.3]
9.27.6.2.	**Thickness and Width**
(1)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OS2.3]
(2)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OS2.3]
(3)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OS2.3]
9.27.6.3.	**Joints**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(2)	[F21, F61-OH1.1, OH1.2, OH1.3]
	[F21, F61-OS2.3]
9.27.7.1.	**Materials**
(1)	[F61-OH1.1, OH1.1, OH1.3]
	[F61-OS2.3]
(2)	[F20, F61-OH1.1, OH1.2, OH1.3]
	[F20, F61-OS2.3]
(3)	[F20, F61-OH1.1, OH1.2, OH1.3]
	[F20, F61-OS2.3]
9.27.7.2.	**Width**
(1)	[F20, F61-OH1.1, OH1.2, OH1.3]
	[F20, F61-OS2.3]
9.27.7.3.	**Fasteners**
(1)	[F20, F61-OH1.1, OH1.2, OH1.3]
	[F20, F61-OS2.3]
9.27.7.4.	**Offsetting of Joints**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(2)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.27.7.5.	**Fastening to Lath**
(1)	[F81-OH1.1, OH1.2, OH1.3]
	[F81-OS2.3]
(2)	[F62-OH1.1, OH1.2, OH1.3]
	[F62-OS2.3]
(3)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OS2.3]
(4)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OS2.3]
(5)	[F62-OH1.1, OH1.2, OH1.3]
	[F62-OS2.3]
9.27.7.6.	**Exposure and Thickness**

Acceptable Solution	Objectives and Functional Statements
(1)	[F20, F62-OH1.1, OH1.2, OH1.3]
	[F20, F62-OS2.3]
9.27.8.1.	**Material Standards**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.27.8.2.	**Weight and Thickness**
(1)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OS2.3]
(2)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OS2.3]
(3)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OS2.3]
9.27.8.3.	**Fastening of Shingles**
(1)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OS2.3]
9.27.8.4.	**Joints of Shingles**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(2)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(3)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.27.8.5	**Joints in Panels**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(2)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.27.9.1.	**Material Standards**
(1)	[F20-OP2.1, OP2.3, OP2.4] [F22-OP2.3, OP2.4, OP2.5] Applies where panel-type cladding is installed to provide the required bracing
	[F20-OS2.1, OS2.3] [F20-OS2.1, OS2.3, OS2.4] [F22-OS2.3, OS2.4, OS2.5] Applies where panel-type cladding is installed to provide required bracing
	[F20, F22-OH1.1, OH1.2, OH1.3]
9.27.9.2.	**Thickness**
(1)	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OS2.1, OS2.3] [F20-OS2.1, OS2.3, OS2.4] [F22-OS2.3, OS2.4, OS2.5] Applies where panel-type cladding is installed to provide required bracing
(2)	[F20-OP2.1, OP2.3] [F22-OP2.3, OP2.4, OP2.5] Applies where panel-type cladding is installed to provide the required bracing
	[F20-OS2.1, OS2.3] [F20-OS2.1, OS2.3, OS2.4] [F22-OS2.3, OS2.4, OS2.5] Applies where panel-type cladding is installed to provide the required bracing
	[F20, F22-OH1.1, OH1.2, OH1.3]
(3)	
9.27.9.3	**Edge Treatment**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OP2.3, OP2.4, OP2.5] Applies where panel-type cladding is installed to provide the required bracing
	[F61-OS2.3] [F61-OS2.3, OS2.4, OS2.5] Applies where panel-type cladding is installed to provide the required bracing
9.27.9.4.	**Panel Cladding**

Acceptable Solution	Objectives and Functional Statements
(1)	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20-OP2.1, OP2.3, OP2.4] [F22-OP2.3, OP2.4, OP2.5] Applies where panel-type cladding is installed to provide the required bracing
	[F20, F22-OS2.1, OS2.3] [F20-OS2.1, OS2.3, OS2.4] [F22-OS2.3, OS2.4, OS2.5] Applies where panel-type cladding is installed to provide the required bracing
(2)	[F21-OH1.1, OH1.2, OH1.3]
	[F21-OS2.3]
(3)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(4)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.27.9.5.	**Lapped Strip Siding**
(1)	[F21, F61-OH1.1, OH1.2, OH1.3]
	[F21, F61-OS2.3]
(2)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(3)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.27.10.1.	**Material Standards**
(1)	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20-OS2.1, OS2.3] [F20-OS2.1, OS2.3, OS2.4] [F22-OS2.3, OS2.4, OS2.5] Applies where panel-type cladding is installed to provide the required bracing
(2)	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20-OS2.1, OS2.3] [F22-OS2.3, OS2.4, OS2.5] Applies where panel-type cladding is installed to provide the required bracing
9.27.10.2.	**Thickness**
(1)	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20-OP2.1, OP2.3, OP2.4] [F22-OP2.3, OP2.4, OP2.5] Applies where panel-type cladding is installed to provide the required bracing
	[F20, F22-OS2.1, OS2.3] [F20-OS2.1, OS2.3, OS2.4] [F22-OS2.3, OS2.4, OS2.5] Applies where panel-type cladding is installed to provide the required bracing
(2)	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OS2.1, OS2.3] [F20-OS2.1, OS2.3, OS2.4] [F22-OS2.3, OS2.4, OS2.5] Applies where panel-type cladding is installed to provide the required bracing
(3)	[F20-OP2.1, OP2.3, OP2.4] [F22-OP2.3, OP2.4, OP2.5] Applies where panel-type cladding is installed to provide the required bracing
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OS2.1, OS2.3] [F20-OS2.1, OS2.3, OS2.4] [F22-OS2.3, OS2.4, OS2.5] Applies where panel-type cladding is installed to provide the required bracing
9.27.10.3.	**Panel Cladding**
(1)	[F20-OP2.1, OP2.3, OP2.4] [F22-OP2.3, OP2.4, OP2.5] Applies where panel-type cladding is installed to provide the required bracing
	[F20, F21, F22-OH1.1, OH1.2, OH1.3]
	[F20, F21, F22-OS2.1, OS2.3] [F20-OS2.1, OS2.3, OS2.4] [F33-OS2.3, OS2.4, OS2.5] Applies where panel-type cladding is installed to provide the required bracing
(2)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]

Acceptable Solution	Objectives and Functional Statements
(3)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.27.10.4.	**Lapped Strip Siding**
(1)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(2)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.27.10.5.	**Clearance**
(1)	[F21-OH1.1, OH1.2, OH1.3]
	[F21-OP2.1, OP2.3, OP2.4, OP2.5] Applies where panel-type cladding is installed to provide the required bracing.
	[F21-OS2.1, OS2.3] [F21-OS2.1, OS2.3, OS2.4, OS2.5] Applies where panel-type cladding is installed to provide the required bracing.
9.27.11.1.	**Material Standard**
(1)	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20-OS2.1, OS2.3] [F20-OS2.1, OS2.3, OS2.4] Applies where panel-type cladding is installed to provide required bracing.
9.27.11.2.	**Thickness**
(1)	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, 22-OS2.1, OS2.3] [F20-OS2.1, OS2.3, OS2.4] [F22-OS2.3, OS2.4, OS2.5] Applies where panel-type cladding is installed to provide the required bracing.
(2)	[F20-OP2.1, OP2.3, OP2.4] [F22-OP2.3, OP2.4, OP2.5] Applies where panel-type cladding is installed to provide the required bracing.
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OS2.1, OS2.3] [F20-OS2.1, OS2.3, OS2.4] [F22-OS2.3, OS2.4, OS2.5] Applies where panel-type cladding is installed to provide the required bracing.
(3)	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, 22-OS2.1, OS2.3] [F20-OS2.1, OS2.3, OS2.4] [F22-OS2.3, OS2.4, OS2.5] Applies where panel-type cladding is installed to provide the required bracing.
(4)	[F20-OP2.1, OP2.3, OP2.4] [F22-OP2.3, OP2.4, OP2.5] Applies where panel-type cladding is installed to provide the required bracing.
	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OS2.1, OS2.3] [F20-OS2.1, OS2.3, OS2.4] [F22-OS2.3, OS2.4, OS2.5] Applies where panel-type cladding is installed to provide the required bracing.
9.27.11.3.	**Panel Cladding**
(1)	[F20, F22, F80-OH1.1, OH1.2, OH1.3]
	[F20, F22, F80-OS2.1, OS2.3] [F20, F80-OS2.1, OS2.3, OS2.4] [F22, F80-OS2.3, OS2.4, OS2.5] Applies where panel-type cladding is installed to provide the required bracing.
(2)	[F21-OH1.1, OH1.2, OH1.3]
	[F21-OS2.3]
(3)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
(4)	[F61-OH1.1, OH1.2, OH1.3]
	[F61-OS2.3]
9.27.11.4.	**Clearance**
(1)	[F21-OH1.1, OH1.2, OH1.3]

Acceptable Solution	Objectives and Functional Statements
	[F21-OP2.1, OP2.3, OP2.4, OP2.5] Applies where panel-type cladding is installed to provide the required bracing.
	[F21-OS2.1, OS2.3] [F21-OS2.1, OS2.3, OS2.4, OS2.5] Applies where panel-type cladding is installed to provide the required bracing.
9.27.12.1.	**Material Standards**
(1)	[F20-OS2.1, OS2.3] [F22, F61-OS2.3]
	[F20, F22, F61, F62-OH1.1, OH1.2, OH1.3]
(2)	[F20, F22, F61-OH1.1, OH1.2, OH1.3]
	[F20-OS2.1, OS2.3] [F22, F61-OS2.3] [F20-OS2.1, OS2.3, OS2.4] [F22-OS2.3, OS2.4, OS2.5] Applies where panel-type cladding is installed to provide the required bracing.
(3)	[F20-OS2.1, OS2.3] [F22, F61-OS2.3]
	[F20, F22, F61-OH1.1, OH1.2, OH1.3]
(4)	[F20, F22, F61-OH1.1, OH1.2, OH1.3]
	[F20-OS2.1, OS2.3] [F22, F61-OS2.3] [F20-OS2.1, OS2.3, OS2.4] [F22-OS2.3, OS2.4, OS2.5] Applies where panel-type cladding is installed to provide the required bracing.
9.27.13.1.	**Material Standard**
(1)	[F20, F61, F62-OH1.1, OH1.2, OH1.3]
	[F20, F61, F62-OS2.3]
9.27.13.2.	**Attachment**
(1)	
9.28.1.1.	**Sheathing Beneath Stucco**
(1)	[F20, F22-OH1.1, OH1.2, OH1.3]
	[F20, F22-OS2.3]
(2)	
9.28.1.2.	**Lath and Reinforcing**
(1)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OS2.3]
(2)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OS2.3]
(3)	[F20, F21-OH1.1]
	[F20, F21-OP1.1]
	[F20, F21-OS1.1]
	[F20, F21-OS2.3]
	[F20, F21-OS3.4]
9.28.1.3.	**Concrete Masonry Units**
(1)	[F80-OH1.1, OH1.2, OH1.3]
	[F80-OP1.1] Applies where stucco is applied to masonry *chimneys*.
	[F80-OS1.1] Applies where stucco is applied to masonry *chimneys*.
	[F80-OS2.3]
	[F80-OS3.4] Applies where stucco is applied to masonry *chimneys*.
9.28.1.4.	**Clearance over Ground Level**
(1)	[F80-OH1.1, OH1.2, OH1.3]
	[F80-OS2.3]
9.28.1.5.	**Flashing and Caulking**
(1)	[F80-OH1.1, OH1.2, OH1.3] Applies to the separation of aluminum flashing from stucco.
	[F80-OS2.3] Applies to the separation of aluminum flashing from stucco.
9.28.2.1.	**Portland Cement**
(1)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OP1.1] Applies where stucco is applied to masonry *chimneys*.

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	[F20-OS1.1] Applies where stucco is applied to masonry chimneys.
	[F20-OS2.3]
	[F20-OS3.4] Applies where stucco is applied to masonry chimneys.
9.28.2.2.	**Aggregate**
(1)	[F80-OH1.1, OH1.2, OH1.3]
	[F80-OP1.1] Applies where stucco is applied to masonry chimneys.
	[F80-OS1.1] Applies where stucco is applied to masonry chimneys.
	[F80-OS2.3]
	[F80-OS3.4] Applies where stucco is applied to masonry chimneys.
(2)	[F20, F80-OH1.1, OH1.2, OH1.3]
	[F20, F80-OP1.1] Applies where stucco is applied to masonry chimneys.
	[F20, F80-OS1.1] Applies where stucco is applied to masonry chimneys.
	[F20, F80-OS2.3]
	[F20, F80-OS3.4] Applies where stucco is applied to masonry chimneys.
9.28.2.3.	**Water**
(1)	[F80-OH1.1, OH1.2, OH1.3]
	[F80-OP1.1] Applies where stucco is applied to masonry chimneys.
	[F80-OS1.1] Applies where stucco is applied to masonry chimneys.
	[F80-OS2.3]
	[F80-OS3.4] Applies where stucco is applied to masonry chimneys.
9.28.3.1.	**Materials**
(1)	[F80-OH1.1, OH1.2, OH1.3]
	[F80-OP1.1] Applies where stucco is applied to masonry chimneys.
	[F80-OS1.1] Applies where stucco is applied to masonry chimneys.
	[F80-OS2.3]
	[F80-OS3.4] Applies where stucco is applied to masonry chimneys.
9.28.3.2.	**Nails and Staples**
(1)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OP1.1] Applies where stucco is applied to masonry chimneys.
	[F20-OS1.1] Applies where stucco is applied to masonry chimneys.
	[F20-OS2.3]
	[F20-OS3.4] Applies where stucco is applied to masonry chimneys.
(2)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OS2.3]
(3)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OP1.1] Applies where stucco is applied to masonry chimneys.
	[F20-OS1.1] Applies where stucco is applied to masonry chimneys.
	[F20-OS2.3]
	[F20-OS3.4] Applies where stucco is applied to masonry chimneys.
(4)	[F20-OS2.1]
9.28.4.1.	**Materials**
(1)	[F80-OH1.1, OH1.2, OH1.3]
	[F80-OP1.1] Applies where stucco is applied to masonry chimneys.
	[F80-OS1.1] Applies where stucco is applied to masonry chimneys.
	[F80-OS2.3]
	[F80-OS3.4] Applies where stucco is applied to masonry chimneys.
(2)	[F80-OH1.1, OH1.2, OH1.3]
	[F80-OP1.1] Applies where stucco is applied to masonry chimneys.
	[F80-OS1.1] Applies where stucco is applied to masonry chimneys.
	[F80-OS2.3]
	[F80-OS3.4] Applies where stucco is applied to masonry chimneys.

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9.28.4.2.	**No Sheathing Required**
(1)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OS2.3]
9.28.4.3.	**Stucco Lath Specifications**
(1)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OP1.1] Applies where stucco is applied to masonry *chimneys*
	[F20-OS1.1] Applies where stucco is applied to masonry *chimneys*
	[F20-OS2.3]
	[F20-OS3.4] Applies where stucco is applied to masonry *chimneys*
9.28.4.4.	**Self-Furring Devices**
(1)	[F20, F80-OH1.1, OH1.2, OH1.3]
	[F20, F80-OP1.1] Applies where stucco is applied to masonry *chimneys*
	[F20, F80-OS1.1] Applies where stucco is applied to masonry *chimneys*
	[F20, F80-OS2.3]
	[F20, F80-OS3.4] Applies where stucco is applied to masonry *chimneys*
9.28.4.5.	**Application of Stucco Lath**
(1)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OP1.1] Applies where stucco is applied to masonry *chimneys*
	[F20-OS1.1] Applies where stucco is applied to masonry *chimneys*
	[F20-OS2.3]
	[F20-OS3.4] Applies where stucco is applied to masonry *chimneys*
(2)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OP1.1] Applies where stucco is applied to masonry *chimneys*
	[F20-OS1.1] Applies where stucco is applied to masonry *chimneys*
	[F20-OS2.3]
	[F20-OS3.4] Applies where stucco is applied to masonry *chimneys*
(3)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OS2.3]
(4)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OP1.1] Applies where stucco is applied to masonry *chimneys*
	[F20-OS1.1] Applies where stucco is applied to masonry *chimneys*
	[F20-OS2.3]
	[F20-OS3.4] Applies where stucco is applied to masonry *chimneys*
9.28.4.6.	**Fastening**
(1)	
(2)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OP1.1] Applies where stucco is applied to masonry *chimneys*
	[F20-OS1.1] Applies where stucco is applied to masonry *chimneys*
	[F20-OS2.3]
	[F20-OS3.4] Applies where stucco is applied to masonry *chimneys*
(3)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OP1.1] Applies where stucco is applied to masonry *chimneys*
	[F20-OS1.1] Applies where stucco is applied to masonry *chimneys*
	[F20-OS2.3]
	[F20-OS3.4] Applies where stucco is applied to masonry *chimneys*
(4)	[F20-OS2.1]
9.28.5.1.	**Mixes**
(1)	[F20, F61, F80-OH1.1, OH1.2, OH1.3]
	[F20, F61, F80-OP1.1] Applies where stucco is applied to masonry *chimneys*
	[F20, F61, F80-OS1.1] Applies where stucco is applied to masonry *chimneys*
	[F20, F61, F80-OS2.3]

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	[F20, F61, F80-OS3.4] Applies where stucco is applied to masonry chimneys
9.28.5.2.	**Pigments**
(1)	[F20, F80-OH1.1, OH1.2, OH1.3]
	[F20, F80-OP1.1] Applies where stucco is applied to masonry chimneys
	[F20, F80-OS1.1] Applies where stucco is applied to masonry chimneys
	[F20, F80-OS2.3]
	[F20, F80-OS3.4] Applies where stucco is applied to masonry chimneys
(2)	[F20, F80-OH1.1, OH1.2, OH1.3]
	[F20, F80-OS2.3]
9.28.5.3.	**Mixing**
(1)	[F20, F80-OH1.1, OH1.2, OH1.3]
	[F20, F80-OP1.1] Applies where stucco is applied to masonry chimneys
	[F20, F80-OS1.1] Applies where stucco is applied to masonry chimneys
	[F20, F80-OS2.3]
	[F20, F80-OS3.4] Applies where stucco is applied to masonry chimneys
(2)	[F20, F80-OH1.1, OH1.2, OH1.3]
	[F20, F80-OP1.1] Applies where stucco is applied to masonry chimneys
	[F20, F80-OS1.1] Applies where stucco is applied to masonry chimneys
	[F20, F80-OS2.3]
	[F20, F80-OS3.4] Applies where stucco is applied to masonry chimneys
9.28.6.1.	**Low Temperature Conditions**
(1)	[F20, F80-OH1.1, OH1.2, OH1.3]
	[F20, F80-OP1.1] Applies where stucco is applied to masonry chimneys
	[F20, F80-OS1.1] Applies where stucco is applied to masonry chimneys
	[F20, F80-OS2.3]
	[F20, F80-OS3.4] Applies where stucco is applied to masonry chimneys
(2)	[F20, F80-OH1.1, OH1.2, OH1.3]
	[F20, F80-OP1.1] Applies where stucco is applied to masonry chimneys
	[F20, F80-OS1.1] Applies where stucco is applied to masonry chimneys
	[F20, F80-OS2.3]
	[F20, F80-OS3.4] Applies where stucco is applied to masonry chimneys
9.28.6.2.	**Number of Coats and Total Thickness**
(1)	[F20, F80-OH1.1, OH1.2, OH1.3]
	[F20, F80-OP1.1] Applies where stucco is applied to masonry chimneys
	[F20, F80-OS1.1] Applies where stucco is applied to masonry chimneys
	[F20, F80-OS2.3]
	[F20, F80-OS3.4] Applies where stucco is applied to masonry chimneys
9.28.6.3.	**First Coat**
(1)	[F20, F80-OH1.1, OH1.2, OH1.3]
	[F20, F80-OP1.1] Applies where stucco is applied to masonry chimneys
	[F20, F80-OS1.1] Applies where stucco is applied to masonry chimneys
	[F20, F80-OS2.3]
	[F20, F80-OS3.4] Applies where stucco is applied to masonry chimneys
(2)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OP1.1] Applies where stucco is applied to masonry chimneys
	[F20-OS1.1] Applies where stucco is applied to masonry chimneys
	[F20-OS2.3]
	[F20-OS3.4] Applies where stucco is applied to masonry chimneys
9.28.6.4.	**Second Coat**
(1)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OP1.1] Applies where stucco is applied to masonry chimneys

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	[F20-OS1.1] Applies where stucco is applied to masonry *chimneys*.
	[F20-OS2.3]
	[F20-OS3.4] Applies where stucco is applied to masonry *chimneys*.
(2)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OP1.1] Applies where stucco is applied to masonry *chimneys*.
	[F20-OS1.1] Applies where stucco is applied to masonry *chimneys*.
	[F20-OS2.3]
	[F20-OS3.4] Applies where stucco is applied to masonry *chimneys*.
9.28.6.5.	**Finish Coat**
(1)	[F80-OH1.1, OH1.2, OH1.3]
	[F80-OP1.1] Applies where stucco is applied to masonry *chimneys*.
	[F80-OS1.1] Applies where stucco is applied to masonry *chimneys*.
	[F80-OS2.3]
	[F80-OS3.4] Applies where stucco is applied to masonry *chimneys*.
(2)	[F20-OH1.1, OH1.2, OH1.3]
	[F20-OP1.1] Applies where stucco is applied to masonry *chimneys*.
	[F20-OS1.1] Applies where stucco is applied to masonry *chimneys*.
	[F20-OS2.3]
	[F20-OS3.4] Applies where stucco is applied to masonry *chimneys*.
(3)	[F80-OH1.1, OH1.2, OH1.3]
	[F80-OP1.1] Applies where stucco is applied to masonry *chimneys*.
	[F80-OS1.1] Applies where stucco is applied to masonry *chimneys*.
	[F80-OS2.3]
	[F80-OS3.4] Applies where stucco is applied to masonry *chimneys*.
9.29.1.1.	**Fire Protection and Sound Control**
(1)	
9.29.2.1.	**Where Required**
(1)	[F80, F81-OP2.3, OP2.4]
	[F80, F81-OS2.3]
	[F80, F81-OH1.1, OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F80, F81-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
9.29.2.2.	**Materials**
(1)	[F80-OP2.3, OP2.4]
	[F80-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F80-OS2.3]
	[F80, F81-OH1.1, OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
9.29.3.1.	**Size and Spacing of Furring**
(1)	[F20, F22-OP2.1, OP2.4]
	[F20, F22-OH1.1, OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20, F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20, F22-OS2.1]
9.29.3.2.	**Fastening**
(1)	[F20-OP2.1, OP2.4]
	[F20-OH1.1, OH1.2] Applies where interior finishes support or serve as required environmental separation elements.

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	[F20-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1]
9.29.4.1.	**Application**
(1)	[F20, F80-OS2.1, OS2.3]
	[F20, F80-OP2.1, OP2.3] [F22, F80-OP2.4]
	[F20, F22, F81, F90-OH1.1, OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20, F80-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
9.29.5.1.	**Application**
(1)	[F20, F80-OP2.1, OP2.3] [F22, F80-OP2.4]
	[F20, F22, F80-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20, F80-OS2.1, OS2.3]
	[F20, F22, F80, F81-OH1.1, OH1.2] Applies where interior finishes support or serves as required environmental separation elements.
(2)	
9.29.5.2.	**Materials**
(1)	[F20, F80-OP2.1, OP2.3] [F22, F80-OP2.4]
	[F20, F22, F80-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20, F80-OS2.1, OS2.3]
	[F20, F22, F80, F81-OH1.1, OH1.2] Applies where interior finishes support or serves as required environmental separation elements.
9.29.5.3.	**Maximum Spacing of Supports**
(1)	[F20-OP2.1] [F20, F22-OP2.4]
	[F20, F22-OH1.1, OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20, F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1]
9.29.5.4.	**Support of Insulation**
(1)	[F20-OS2.1]
	[F20-OP2.1] [F20, F22-OP2.4]
	[F20, F22-OH1.1, OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20, F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
9.29.5.5.	**Length of Fasteners**
(1)	[F20-OP2.1, OP2.4]
	[F20-OH1.1, OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1]
9.29.5.6.	**Nails**
(1)	[F20-OP2.1, OP2.4]
	[F20-OH1.1, OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1]

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9.29.5.7.	**Screws**
(1)	[F20-OP2.1, OP2.4]
	[F20-OH1.1, OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1]
9.29.5.8.	**Spacing of Nails**
(1)	[F20-OH1.1, OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OP1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OP2.1] [F20-OP2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1] [F20-OS2.3] Applies where interior finishes support or serve as required environmental separation elements.
(2)	
(3)	[F20-OH1.1, OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OP2.1] [F20-OP2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OS2.1] [F20-OS2.3] Applies where interior finishes support or serve as required environmental separation elements.
(4)	[F20-OP1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OP2.1] [F20-OP2.5] [F22-OP2.4, OP2.5] Applies where interior finishes contribute to the required bracing or lateral support for studs. [F20, F22-OP2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OP3.1] Applies where interior finishes are installed to contribute to the required fire resistance of exterior walls.
	[F20-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1] [F20-OS2.5] [F22-OS2.4, OS2.5] Applies where interior finishes contribute to the required bracing or lateral support for studs. [F20, F22-OS2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20, F22-OS3.1, OS3.7] Applies where walls support floors and where interior finishes contribute to the required bracing or lateral support studs or where interior support or serve as required environmental separation elements.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies where interior finishes contribute to the required bracing or lateral support for studs or where finishes support or serve as required environmental separation elements.
	[F20, F22-OH4] Applies where walls support floors and where interior finishes contribute to the required bracing or lateral support studs or where interior support or serve as required environmental separation elements.
(5)	[F20-OP1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OP2.1] [F20-OP2.5] [F22-OP2.4, OP2.5] Applies where interior finishes contribute to the required bracing or lateral support for studs. [F20, F22-OP2.3] Applies where interior finishes support or serve as required environmental separation elements.

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	[F20-OP3.1] Applies where interior finishes are installed to contribute to the required fire resistance of exterior walls.
	[F20-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1] [F20-OS2.5] [F22-OS2.4, OS2.5] Applies where interior finishes contribute to the required bracing or lateral support for studs. [F20, F22-OS2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OS3.1, OS3.7] Applies where walls support floors and where interior finishes contribute to the required bracing or lateral support for studs or where interior finishes support or serve as required environmental separation elements.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies where interior finishes contribute to the required bracing or lateral support for studs or where interior finishes support or serve as required environmental separation elements.
	[F20-OH4] Applies where walls support floors and where interior finishes contribute to the required bracing or lateral support for studs or where interior support or serve as required environmental separation elements.
(6)	[F20-OP1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OP2.1] [F20-OP2.5] [F22-OP2.4, OP2.5] Applies where interior finishes contribute to the required bracing or lateral support for studs. [F20, F22-OP2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1] [F20-OS2.5] [F22-OS2.4, OS2.5] Applies where interior finishes contribute to the required bracing or lateral support for studs. [F20, F22-OS2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OS3.1, OS3.7] Applies where walls support floors and where interior finishes contribute to the required bracing or lateral support for studs or where interior finishes support or serve as required environmental separation elements.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OH4] Applies where walls support floors and where interior finishes contribute to the required bracing or lateral support for studs or where interior support or serve as required environmental separation elements.
(7)	[F20-OP1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OP2.1] [F20-OP2.5] [F22-OP2.4, OP2.5] Applies where interior finishes contribute to the required bracing or lateral support for studs. [F20, F22-OP2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OP3.1] Applies where interior finishes are installed to contribute to the required fire resistance of exterior walls.
	[F20-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1] [F20-OS2.5] [F22-OS2.4, OS2.5] Applies where interior finishes contribute to the required bracing or lateral support for studs. [F20, F22-OS2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OS3.1, OS3.7] Applies where walls support floors and where interior finishes contribute to the required bracing or lateral support for studs or where interior finishes support or serve as required environmental separation elements.

Acceptable Solution	Objectives and Functional Statements
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies where interior finishes contribute to the required bracing or lateral support for studs or where interior finishes support or serve as required environmental separation elements.
	[F20-OH4] Applies where walls support floors and where interior finishes contribute to the required bracing or lateral support for studs or where interior finishes support or serve as required environmental separation elements.
9.29.5.9.	**Spacing of Screws**
(1)	[F20-OH1.1, OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OP1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OP2.1] [F20-OP2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1] [F20-OS2.3] Applies where interior finishes support or serve as required environmental separation elements.
(2)	
(3)	[F20-OH1.1, OH1.2, OH1.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OP1.2] Applies where gypsum board is required to provide the fire resistance and the rating of an assembly.
	[F20-OP2.1] [F20-OP2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OP3.1] Applies where interior finishes are installed to contribute to the required fire resistance of exterior walls.
	[F20-OS1.2] Applies where gypsum board is required to provide the fire resistance and the rating of an assembly.
	[F20-OS2.1] [F20-OS2.3] Applies where interior finishes support or serve as required environmental separation elements.
(4)	[F20-OP1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OP2.1] [F20-OP2.5] [F22-OP2.4, OP2.5] Applies where interior finishes contribute to the required bracing or lateral support for studs. [F20, F22-OP2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OP3.1] Applies where interior finishes are installed to contribute to the required fire resistance of exterior walls.
	[F20-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1] [F20-OS2.5] [F22-OS2.4, OS2.5] Applies where interior finishes contribute to the required bracing or lateral support for studs. [F20, F22-OS2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20, F22-OS3.1, OS3.7] Applies where the walls support floors and where interior finishes contribute to the required bracing or lateral support for studs or where interior finishes support or serve as required environmental separation elements.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies where interior finishes contribute to the required bracing or lateral support for studs or where interior finishes support or serve as required environmental separation elements.
	[F20, F22-OH4] Applies where the walls support floors and where interior finishes contribute to the required bracing or lateral support for studs or where interior finishes support or serve as required environmental separation elements.
(5)	

Acceptable Solution	Objectives and Functional Statements
(6)	[F20-OP1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OP2.1] [F20-OP2.5] [F22-OP2.4, OP2.5] Applies where interior finishes contribute the required bracing or lateral support for studs. [F20, F22-OP2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OP3.1] Applies where interior finishes are installed to contribute to the required fire resistance of exterior walls.
	[F20-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1] [F20-OS2.5] [F22-OS2.4, OS2.5] Applies where interior finishes contribute the required bracing or lateral support for studs. [F20, F22-OS2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OS3.1, OS3.7] Applies where the walls support floors and where interior finishes contribute to the required bracing or lateral support for studs or where interior finishes support or serve as required environmental separation elements.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies where interior finishes contribute to the required bracing or lateral support for studs or where interior finishes support or serve as required environmental separation elements.
	[F20-OH4] Applies where walls support floors and where interior finishes contribute to the required bracing or lateral support for studs or where interior finishes support or serve as required environmental separation elements.
(7)	[F20-OP1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OP2.1] [F20-OP2.5] [F22-OP2.4, OP2.5] Applies where interior finishes contribute the required bracing or lateral support for studs. [F20, F22-OP2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OP3.1] Applies where interior finishes are installed to contribute to the required fire resistance of exterior walls.
	[F20-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1] [F20-OS2.5] [F22-OS2.4, OS2.5] Applies where interior finishes support or serve as required environmental separation elements. [F20, F22-OS2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OS3.1, OS3.7] Applies where the walls support floors and where interior finishes contribute to the required bracing or lateral support for studs or where interior finishes support or serve as required environmental separation elements.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies where interior finishes contribute to the required bracing or lateral support for studs or where interior finishes support or serve as required environmental separation elements.
	[F20-OH4] Applies where walls support floors and where interior finishes contribute to the required bracing or lateral support for studs or where interior finishes support or serve as required environmental separation elements.
9.29.5.10.	**Low Temperature Conditions**
(1)	[F81-OS1.2] Applies where the finishing of joints is required to maintain required *fire-resistance ratings*.
9.29.6.1.	**Thickness**
(1)	[F20-OP2.1] [F20, F22-OP2.4]
	[F20, F22-OH1.1, OH1.2] Applies where interior finishes support or serve as required environmental separation elements.

Acceptable Solution	Objectives and Functional Statements
	[F20, F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1]
(2)	
(3)	
9.29.6.2.	**Grooved Plywood**
(1)	[F20, F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1]
	[F20-OP2.1] [F20, F22-OP2.4]
	[F20, F22-OH1.1, OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
(2)	
9.29.6.3.	**Nails and Staples**
(1)	[F20-OP2.1] [F20, F22-OP2.4]
	[F20, F22-OH1.1, OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20, F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1]
9.29.6.4.	**Edge Support**
(1)	[F20-OP2.1] [F20, F22-OP2.4]
	[F20, F22-OH1.1, OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20, F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1]
9.29.7.1.	**Material Standard**
(1)	[F20, F80-OP2.1, OP2.3] [F20, F22-OP2.4]
	[F20, F22, F80-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20, F80-OS2.1, OS2.3]
	[F20, F22, F80-OH1.1, OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
9.29.7.2.	**Thickness**
(1)	[F20-OP2.1] [F20, F22-OP2.4]
	[F20, F22-OH1.1, OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OS2.1]
	[F20, F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
9.29.7.3.	**Nails**
(1)	[F20-OP2.1] [F20, F22-OP2.4]
	[F20, F22-OH1.1, OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20, F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1]
9.29.7.4.	**Edge Support**
(1)	[F20-OP2.1] [F20, F22-OP2.4]
	[F20, F22-OH1.1, OH1.2] Applies where interior finishes support or serve as required environmental separation elements.

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	[F20, F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1]
9.29.8.1.	**Material Standard**
(1)	[F20F80-OP2.1, OP2.3]
	[F20, F22-OP2.4]
	[F20, F22, F80-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20, F80-OS2.1, OS2.3]
	[F20, F22, F80, F81-OH1.1, OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
9.29.8.2.	**Thickness**
(1)	[F20-OP2.1] [F20, F22-OP2.4]
	[F20, F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1]
	[F20, F22-OH1.1, OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
(2)	[F20-OP2.1] [F20, F22-OP2.4]
	[F20, F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1]
	[F20, F22-OH1.1, OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
9.29.8.3.	**Nails**
(1)	[F20-OP2.1] [F20, F22-OP2.4]
	[F20, F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1]
	[F20, F22-OH1.1, OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
(2)	[F20-OP2.1] [F20, F22-OP2.4]
	[F20, F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1]
	[F20, F22-OH1.1, OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
9.29.8.4.	**Edge Support**
(1)	[F20-OP2.1] [F20, F22-OP2.4]
	[F20, F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1]
	[F20, F22-OH1.1, OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
9.29.9.1.	**Material Standard**
(1)	[F20-OP2.1] [F20, F22-OP2.4]
	[F20, F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1]
	[F20, F22-OH1.1, OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
(2)	[F20-OP2.1] [F20, F22-O

Acceptable Solution	Objectives and Functional Statements
	[F20, F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1]
	[F20, F22-OH1.1, OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
9.29.9.2.	**Minimum Thickness**
(1)	[F20-OP2.1] [F20, F22-OP2.4]
	[F20, F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1]
	[F20, F22-OH1.1, OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
(2)	
(3)	
(4)	[F20-OP2.1] [F20, F22-OP2.4]
	[F20, F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1]
	[F20, F22-OH1.1, OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
(5)	[F20-OP2.1] [F20-OP2.5] [F22-OP2.4, OP2.5] Applies where interior finishes contribute to the required bracing or lateral support for studs. [F20, F22-OP2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20, F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics.
	[F20-OS2.1] [F20-OS2.5] [F22-OS2.4, OS2.5] Applies where interior finishes contribute to the required bracing or lateral support for studs. [F20, F22-OS2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20, F22-OH1.1, OH1.2, OH1.3] Applies where interior finishes support or serve as required environmental separation elements, or where interior finishes contribute to the required bracing of exterior walls.
9.29.9.3.	**Nails**
(1)	[F20-OP2.1] [F20, F22-OP2.4]
	[F20, F22-OH1.1, OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20, F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1]
9.29.9.4.	**Edge Support**
(1)	[F20-OP2.1] [F20, F22-OP2.4]
	[F20, F22-OH1.1, OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20, F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1]
9.29.10.1.	**Tile Application**
(1)	[F20-OP2.1] [F20-OP2.5] [F22-OP2.4, OP2.5] Applies where the substrate for the tile contribute to the required bracing or lateral support for studs. [F20-OP2.3] Applies where the substrate for the tile serves as a require environmental separation element or where the tile is installed to provide the required waterproof wall finish.

Acceptable Solution	Objectives and Functional Statements
	[F20-OS1.2] Applies where the substrate is required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1] [F20-OS2.5] [F22-OS2.4, OS2.5] Applies where the substrate for the tile contributes to the required bracing or lateral support for studs. [F20-OS2.3] Applies where the substrate for the tile serves as a required environmental separation element or where the tile is installed to provide the required waterproof wall finish.
	[F20, F81-OH1.1, OH1.2] Applies where the substrate serves as a required environmental separation element.
(2)	[F20-OP2.1] [F20-OP2.5] [F22-OP2.4, OP2.5] Applies where the substrate for the tile contribute to the required bracing or lateral support for studs. [F20-OP2.3] Applies where the substrate for the tile serves as a require environmental separation element or where the tile is installed to provide the required waterproof wall finish.
	[F20-OS1.2] Applies where the substrate is required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1] [F20-OS2.5] [F22-OS2.4, OS2.5] Applies where the substrate for the tile contributes to the required bracing or lateral support for studs. [F20-OS2.3] Applies where the substrate for the tile serves as a required environmental separation element or where the tile is installed to provide the required waterproof wall finish.
	[F20, F81-OH1.1, OH1.2] Applies where the substrate serves as a required environmental separation element.
9.29.10.2.	**Mortar Base**
(1)	[F20-OP2.1] [F20-OP2.5] [F22-OP2.4, OP2.5] Applies where the substrate for the tile contribute to the required bracing or lateral support for studs. [F20-OP2.3] Applies where the substrate for the tile serves as a require environmental separation element or where the tile is installed to provide the required waterproof wall finish.
	[F20-OS1.2] Applies where the substrate is required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1] [F20-OS2.5] [F22-OS2.4, OS2.5] Applies where the substrate for the tile contributes to the required bracing or lateral support for studs. [F20-OS2.3] Applies where the substrate for the tile serves as a required environmental separation element or where the tile is installed to provide the required waterproof wall finish.
	[F20, F81-OH1.1, OH1.2] Applies where the substrate serves as a required environmental separation element.
(2)	[F20-OP2.1] [F20-OP2.5] [F22-OP2.4, OP2.5] Applies where the substrate for the tile contribute to the required bracing or lateral support for studs. [F20-OP2.3] Applies where the substrate for the tile serves as a require environmental separation element or where the tile is installed to provide the required waterproof wall finish.
	[F20-OS1.2] Applies where the substrate is required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1] [F20-OS2.5] [F22-OS2.4, OS2.5] Applies where the substrate for the tile contributes to the required bracing or lateral support for studs. [F20-OS2.3] Applies where the substrate for the tile serves as a required environmental separation element or where the tile is installed to provide the required waterproof wall finish.
	[F20, F81-OH1.1, OH1.2] Applies where the substrate serves as a required environmental separation element.
(3)	[F20-OP2.1] [F20-OP2.5] [F22-OP2.4, OP2.5] Applies where the substrate for the tile contribute to the required bracing or lateral support for studs. [F20-OP2.3] Applies where the substrate for the tile serves as a require environmental separation element or where the tile is installed to provide the required waterproof wall finish.
	[F20-OS1.2] Applies where the substrate is required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.

Acceptable Solution	Objectives and Functional Statements
	[F20-OS2.1] [F20-OS2.5] [F22-OS2.4, OS2.5] Applies where the substrate for the tile contributes to the required bracing or lateral support for studs. [F20-OS2.3] Applies where the substrate for the tile serves as a required environmental separation element or where the tile is installed to provide the required waterproof wall finish.
	[F20, F81-OH1.1, OH1.2] Applies where the substrate serves as a required environmental separation element.
(4)	[F20-OP2.1] [F20-OP2.5] [F22-OP2.4, OP2.5] Applies where the substrate for the tile contribute to the required bracing or lateral support for studs. [F20-OP2.3] Applies where the substrate for the tile serves as a require environmental separation element or where the tile is installed to provide the required waterproof wall finish.
	[F20-OS1.2] Applies where the substrate is required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1] [F20-OS2.5] [F22-OS2.4, OS2.5] Applies where the substrate for the tile contributes to the required bracing or lateral support for studs. [F20-OS2.3] Applies where the substrate for the tile serves as a required environmental separation element or where the tile is installed to provide the required waterproof wall finish.
	[F20-OH1.1, OH1.2] Applies where the substrate serves as a required environmental separation element.
9.29.10.3.	**Adhesives**
(1)	[F20-OP2.3, OP2.4]
	[F20-OH1.1, OH1.2] Applies where the substrate serves as a required environmental separation element.
	[F20-OS1.2] Applies where the substrate is required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.3]
9.29.10.4.	**Moisture Resistant Backing**
(1)	[F81-OP2.3, OP2.4]
	[F20-OS1.2] Applies where the substrate is required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.3]
	[F81-OH1.1, OH1.2] Applies where the substrate serves as a required environmental separation element.
9.29.10.5.	**Joints between Tiles and Bathtub**
(1)	[F81-OP2.3, OP2.4]
	[F81-OH1.1, OH1.2] Applies where the substrate serves as a required environmental separation element.
	[F81-OS1.2] Applies where the substrate is required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F81-OS2.3]
9.30.1.1.	**Required Finish Flooring**
(1)	[F30-OS3.1]
	[F40, F41-OH2.4]
9.30.1.2.	**Water Resistance**
(1)	[F41, F81-OH1.1] Applies where finished flooring is required to provide water resistance.
	[F80-OS2.3] Applies where finished flooring is required to provide water resistance.
9.30.1.3.	**Sleepers**
(1)	[F20, F80-OS3.1]
	[F80-OH1.1] Applies to portion of Code text: "Wood sleepers support finished flooring over a concrete base supported on the ground ... shall be treated with a wood preservative."
9.30.1.4.	**Finish Quality**
(1)	
9.30.2.1.	**Required Underlay**
(1)	[F81-OH1.1] Applies where finished flooring is required to provide water resistance.
	[F81-OS2.3] Applies where finished flooring is required to provide water resistance.
	[F81-OS3.1]

Acceptable Solution	Objectives and Functional Statements
(2)	[F81-OH1.1] Applies where finished flooring is required to provide water resistance
	[F81-OS2.3] Applies where finished flooring is required to provide water resistance
	[F81-OS3.1]
(3)	[F81-OH1.1] Applies where finished flooring is required to provide water resistance
	[F81-OS2.3] Applies where finished flooring is required to provide water resistance
	[F81-OS3.1]
(4)	[F81-OH1.1] Applies where finished flooring is required to provide water resistance
	[F81-OS2.3] Applies where finished flooring is required to provide water resistance
	[F81-OS3.1]
9.30.2.2.	**Materials and Thickness**
(1)	[F81-OH1.1] Applies where finished flooring is required to provide water resistance
	[F81-OS2.3] Applies where finished flooring is required to provide water resistance
	[F81-OS3.1]
9.30.2.3.	**Fastening**
(1)	[F81-OH1.1] Applies where finished flooring is required to provide water resistance
	[F81-OS2.3] Applies where finished flooring is required to provide water resistance
	[F81-OS3.1]
(2)	[F81-OH1.1] Applies where finished flooring is required to provide water resistance
	[F81-OS2.3] Applies where finished flooring is required to provide water resistance
	[F81-OS3.1]
(3)	[F81-OH1.1] Applies where finished flooring is required to provide water resistance
	[F81-OS2.3] Applies where finished flooring is required to provide water resistance
	[F81-OS3.1]
9.30.2.4.	**Joints Offset**
(1)	[F81-OH1.1] Applies where finished flooring is required to provide water resistance
	[F81-OS3.1]
	[F81-OS2.3] Applies where finished flooring is required to provide water resistance
9.30.2.5.	**Surface Defects**
(1)	[F81-OH1.1] Applies where finished flooring is required to provide water resistance
	[F81-OS2.3] Applies where finished flooring is required to provide water resistance
	[F81-OS3.1]
9.30.3.1.	**Thickness**
(1)	[F20-OS2.1]
	[F30-OS3.1]
9.30.3.2.	**Strip Direction and End Joints**
(1)	[F30-OS3.1]
(2)	[F20-OS2.1]
(3)	[F20-OS2.1]
9.30.3.3.	**Nailing**
(1)	[F30-OS3.1]
(2)	[F30-OS3.1]
9.30.3.4.	**Staples**
(1)	[F30-OS3.1]
(2)	[F30-OS3.1]
9.30.4.1.	**Adhesive**
(1)	[F81-OS3.1]
9.30.5.1.	**Materials**
(1)	[F41, F80-OH1.1]
	[F80-OS3.1]
(2)	[F41-OH1.1]
	[F81, F80-OS3.1]

Acceptable Solution	Objectives and Functional Statements
9.30.6.1.	**Application**
(1)	[F81-OH1.1] Applies where finished flooring is required to provide water resistance.
	[F81-OS2.3] Applies where finished flooring is required to provide water resistance.
	[F81-OS3.1]
(2)	[F81-OH1.1] Applies where finished flooring is required to provide water resistance.
	[F81-OS2.3] Applies where finished flooring is required to provide water resistance.
	[F81-OS3.1]
9.30.6.2.	**Ceramic Tile Set in Mortar Bed**
(1)	[F81-OH1.1] Applies where finished flooring is required to provide water resistance.
	[F22-OP2.3, OP2.4]
	[F81-OS2.3]
	[F81-OS3.1] Applies where finished flooring is required to provide water resistance.
(2)	[F22-OP2.3, OP2.4]
(3)	[F81-OS2.3]
	[F81-OS3.1]
9.30.6.3.	**Reinforcement for Panel-Type Wood Sheathing**
(1)	[F22-OP2.3, OP2.4]
9.30.6.4.	**Ceramic Tile Applied to Mortar Bed with Adhesive**
(1)	[F22-OP2.3, OP2.4]
(2)	[F22-OP2.3, OP2.4]
(3)	[F22-OP2.3, OP2.4]
(4)	[F22-OP2.3, OP2.4]
(5)	[F22-OP2.3, OP2.4]
(6)	[F81-OS2.3]
	[F81-OS3.1]
(7)	[F22-OP2.3, OP2.4]
(8)	[F81-OS2.3]
	[F81-OS3.1]
9.31.1.1.	**Application**
(1)	
(2)	
(3)	
9.31.2.1.	**General**
(1)	
9.31.2.2.	**Corrosion Protection**
(1)	[F80-OH2.1]
	[F80-OS2.3]
9.31.2.3.	**Grab Bars**
(1)	[F20-OS3.1]
9.31.3.1.	**Reserved**
9.31.3.2.	**Required Connections**
(1)	[F70, F71-OH2.3]
(2)	[F70, F71-OH2.3]
9.31.4.1.	**Required Fixtures**
(1)	[F70, F71, F72-OH2.1, OH2.3]
9.31.4.2.	**Laundry Fixtures**
(1)	
9.31.4.3.	**Hot Water Supply**
(1)	[F71-OH2.3]
(2)	
9.31.4.4.	**Floor Drains**

Acceptable Solution	Objectives and Functional Statements
(1)	[F40, F41, F62-OH1.2, OH1.3] [F62-OH1.1]
9.31.6.1.	**Hot Water Temperature**
(1)	[F31-OS2.3] Applies to hot water supply equipment.
	[F41-OH2.2] Applies to hot water supply equipment.
9.31.6.2.	**Equipment and Installation**
(1)	
(2)	
(3)	[F01-OS1.1]
	[F23-OS3.4]
9.31.6.3.	**Corrosion-Resistant Coating**
(1)	[F80, F81-OH2.3]
9.31.6.4.	**Fuel-Burning Heaters**
(1)	[F01-OS1.1]
	[F44-OH1.1]
9.31.6.5.	**Heating Coils**
(1)	[F31-OS2.3]
	[F71-OH2.3]
9.32.1.1.	**Application**
(1)	
(2)	
(3)	
(4)	
(5)	
9.32.1.2.	**Mechanical Ventilation for Dwelling Units**
(1)	[F40, F50, F52-OH1.1] [F51, F52-OH1.2]
9.32.1.3.	**Ventilation of Rooms and Spaces**
(1)	[F40, F50, F52-OH1.1] [F51, F52-OH1.2]
(2)	
(3)	[F40, F50, F52-OH1.1] [F51, F52-OH1.2]
9.32.2.1.	**Natural Ventilation Area**
(1)	[F40, F50, F52-OH1.1] [F51, F52-OH1.2]
(2)	
9.32.2.2.	**Protection from Weather and Insects**
(1)	[F42, F61 -OH1.1]
	[F42, F61-OS2.3] [F42-OH2.5]
(2)	[F42, F80-OH1.1, OH1.2]
	[F80-OH2.5]
9.32.3.1.	**General**
(1)	
(2)	
9.32.3.2.	**Required Mechanical Ventilation**
(1)	
9.32.3.3.	**Total Ventilation Capacity**
(1)	[F40, F50, F52-OH1.1] [F51, F52-OH1.2]
9.32.3.4.	**Principal Exhaust**
(1)	[F40, F50, F52-OH1.1] [F51, F52-OH1.2]
(2)	[F81-OH1.1]
(3)	[F81-OH1.1]
(4)	[F81-OH1.1]
(5)	
(6)	[F131-OR2]

Acceptable Solution	Objectives and Functional Statements
(7)	[F40, F50, F52-OH1.1]
(8)	[F40-OH1.1]
(9)	[F40, F50, F52, F53-OH1.1]
	[F53-OS3.4]
(10)	
9.32.3.5.	**Supplemental Exhaust**
(1)	[F40, F50, F52, F53-OH1.1]
	[F53-OS3.4]
(2)	[F40, F50, F52-OH1.1] [F52-OH1.2]
(3)	[F40-OH1.1]
(4)	[F40, F50, F52, F53-OH1.1]
	[F53-OS3.4]
(5)	[F40-OH1.1]
(6)	[F40-OH1.1]
(7)	[F40-OH1.1]
(8)	[F40-OH1.1]
(9)	
9.32.3.6.	**Ventilation Systems Coupled with Forced Air Heating Systems**
(1)	
(2)	
(3)	[F53, F81-OH1.1]
	[F43, F50, F53, F81-OS3.4]
(4)	[F53, F63-OH1.1]
	[F53, F63-OS2.3]
	[F50, F53-OS3.4]
(5)	[F81-OH1.1]
9.32.3.7.	**Ventilation Systems Not Coupled with Forced Air Heating Systems**
(1)	
(2)	[F40, F50, F52-OH1.1]
(3)	[F53, F81-OH1.1]
	[F43, F50, F53, F81-OS3.4]
(4)	[F40, F50, F52-OH1.1]
(5)	[F40, F50, F52, F53-OH1.1]
	[F53-OS3.4]
(6)	
(7)	[F40, F50, F52, F53-OH1.1]
(8)	
(9)	[F40, F50, F52, F53-OH1.1]
	[F53-OS3.4]
(10)	[F40, F50, F52-OH1.1]
9.32.3.8.	**Protection Against Depressurization**
(1)	
(2)	[F53, F81-OH1.1]
	[F43, F50, F53, F81-OS3.4]
9.32.3.9.	**Fan Ratings**
(1)	[F40, F50, F52, F53-OH1.1] [F51, F52-OH1.2]
	[F53, F63-OS2.3]
(2)	[F81-OH1.1, OH1.2]
(3)	[F53-OH1.1, OH1.2]
	[F53-OS3.4]

Acceptable Solution	Objectives and Functional Statements
(4)	[F81-OH1.1, OH1.2]
(5)	[F40, F50, F52, F53-OH1.1] [F51, F52-OH1.2]
	[F53, F63-OS2.3]
(6)	[F40, F50, F52, F53-OH1.1] [F51, F52-OH1.2]
	[F81-OS3.4]
9.32.3.10.	**Ducts**
(1)	[F81-OH1.1]
(2)	[F40, F52, F63-OH1.1]
	[F52, F63-OS2.3]
(3)	[F63-OH1.1]
	[F63, F80-OS2.3]
	[F131-OR2]
(4)	[F63-OH1.1] [F131-OR2]
(5)	[F82-OH1.1]
	[F82-OP1.1]
	[F82-OS1.1]
(6)	[F02, F03, F80-OS1.1]
(7)	[F02, F03, F82-OS1.1]
(8)	[F40, F41-OH1.1]
	[F40, F63-OS2.3]
(9)	[F40, F41-OH1.1]
	[F40, F63-OS2.3]
(10)	[F40, F50, F52, F53-OH1.1]
	[F53-OS3.4]
9.32.3.11.	**Heat Recovery Ventilators**
(1)	
(2)	[F131-OR2]
(3)	[F51, F81-OH1.2]
(4)	[F40, F50, F52-OH1.1]
(5)	[F40, F50, F52-OH1.1]
(6)	[F81-OH1.1]
(7)	[F53-OH1.1, OH1.2]
	[F53, F63-OS2.3]
	[F43, F53-OS3.4]
(8)	[F62-OH1.1]
(9)	[F81-OH1.1]
(10)	[F53-OH1.1, OH1.2]
	[F53, F63-OS2.3]
	[F43, F53-OS3.4]
9.32.3.12.	**Outdoor Intake and Exhaust Openings**
(1)	[F40, F50, F52-OH1.1]
	[F40, F44, F50-OS3.4]
(2)	[F40, F50, F52-OH1.1]
	[F40, F44, F50-OS3.4]
(3)	[F40, F50, F52, F53-OH1.1]
	[F43, F53-OS3.4]
(4)	[F40, F50, F52-OH1.1]
	[F40, F50, F44-OS3.4]
(5)	[F40, F50, F52-OH1.1]
	[F40, F44, F50, F53-OS3.4]
(6)	[F40, F53-OH1.1]

Acceptable Solution	Objectives and Functional Statements
(7)	[F61-OH1.1]
	[F61-OS2.3]
(8)	[F42-OH1.1]
	[F42-OH2.5]
	[F01, F42-OS1.1]
(9)	[F42, F63-OH1.1]
	[F01, F42-OS1.1]
(10)	[F42-OH1.1]
(11)	[F53, F82-OH1.1]
	[F43, F53, F82-OS3.4]
(12)	[F53, F81-OH1.1]
	[F43, F53-OS3.4]
(13)	[F42, F80-OH2.5]
	[F01, F42, F80-OS1.1]
(14)	[F53, F81-OH1.1]
	[F43, F53-OS3.4]
9.32.3.13.	**Installation**
(1)	[F81-OH1.1]
	[F81-OS3.4]
(2)	[F40, F43, F50, F53-OH1.1]
	[F43, F53, F82-OS3.4]
(3)	[F82-OH1.1]
(4)	[F63, F81-OH1.1]
9.33.1.1.	**Design and Installation Requirements**
(1)	
(2)	
(3)	
9.33.1.2.	**Solid Fuel-Burning Appliances**
(1)	[F43-OP1.1]
	[F43-OS1.1]
	[F43-OS3.4]
9.33.1.3.	**Structural Movement**
(1)	[F20-OS1.1]
	[F20-OS3.3, OS3.4]
9.33.2.1.	**Residential Heating Systems**
(1)	[F51, F52-OH1.2] [F63-OH1.1]
	[F63-OS2.3]
9.33.3.1.	**Indoor Design Temperatures**
(1)	(a), (b), (c) [F51-OH1.2]
9.33.3.2.	**Outdoor Design Temperatures**
(1)	
9.33.4.1.	**Application**
(1)	
9.33.4.2.	**Location of Carbon Monoxide Detectors**
(1)	[F44-OS3.4]
(2)	[F44-OS3.4]
(3)	[F44-OS3.4]
(4)	[F44-OS3.4]
9.33.4.3.	**Installation and Conformance to Standards**
(1)	[F44-OS3.4]
	(a), (d) [F81-OS3.4]

Acceptable Solution	Objectives and Functional Statements
9.34.1.1.	**Reserved**
9.34.1.2.	**Required Facilities**
(1)	
9.34.1.3.	**Location of Equipment in Public Areas**
(1)	[F10-OS3.1] [F32, F81-OS3.3]
9.34.1.4.	**Recessed Lighting Fixtures**
(1)	[F01-OS1.1]
9.34.1.5.	**Wiring and Cables**
(1)	
(2)	
9.34.2.1.	**Lighting of Entrances**
(1)	[F30-OS3.1]
	[F34-OS4.2]
9.34.2.2.	**Outlets in Dwelling Units**
(1)	[F30-OS3.1]
(2)	[F30-OS3.1]
9.34.2.3.	**Stairways**
(1)	[F30-OS3.1]
(2)	[F30-OS3.1]
(3)	
9.34.2.4.	**Basements**
(1)	[F30-OS3.1]
(2)	[F30-OS3.1]
9.34.2.5.	**Storage Rooms**
(1)	[F30-OS3.1]
9.34.2.6.	**Garages and Carports**
(1)	[F30-OS3.1]
(2)	[F30-OS3.1]
(3)	[F30-OS3.1]
(4)	
9.34.2.7.	**Public and Service Areas**
(1)	[F30-OS3.1]
(2)	[F30-OS3.1]
(3)	[F30-OS3.1]
9.34.3.1.	**Emergency Lighting**
(1)	
9.34.4.1.	**Meter Mounting Device**
(1)	
(2)	
9.34.4.2.	**Location of Meter Mounting Device**
(1)	
(2)	
9.34.4.3.	**Location of Consumer Service Standpipe**
(1)	
(2)	
9.34.4.4.	**Meter Mounting Device**
(1)	
9.34.4.5.	**Underground Service**
(1)	
9.35.1.1.	**Application**
(1)	

Acceptable Solution	Objectives and Functional Statements
9.35.1.2.	**Construction Requirements**
(1)	
9.35.2.1.	**Carport Considered to be Garage**
(1)	
9.35.2.2.	**Garage Floor**
(1)	[F40-OS1.1]
9.35.3.1.	**Foundation Required**
(1)	
9.35.3.2.	**Protection from Damage due to Soil Movement**
(1)	[F21-OH1.1, OH1.2, OH1.3]
	[F21-OH4] Applies to floors and elements that support floors
	[F21-OP2.3, OP2.4]
	[F21-OS2.3]
	[F21-OS3.1] Applies to floors and elements that support floors
(2)	[F21-OH1.1, OH1.2, OH1.3]
	[F21-OH4] Applies to floors and elements that support floors
	[F21-OP2.3, OP2.4]
	[F21-OS2.3]
	[F21-OS3.1] Applies to floors and elements that support floors
(3)	
9.35.3.3.	**Small Garages**
(1)	
9.35.3.4.	**Column Piers**
(1)	[F80-OP2.3]
	[F80-OS2.3]
(2)	[F20-OP2.1, OP2.2]
	[F20-OS2.1, OS2.2]
9.35.4.1.	**Interior Finish**
(1)	
9.35.4.2.	**Columns**
(1)	[F20-OP2.1]
	[F20-OS2.1]
9.35.4.3.	**Anchorage**
(1)	[F22-OP2.4, OP2.5]
	[F22-OS2.4, OS2.5]
9.36.1.1.	**Application**
(1)	
(2)	
9.36.2.1.	**Exclusions**
(1)	
(2)	[F42-OH2.5]
	[F20-OP2.1]
	[F20-OS2.1] [F30-OS3.1]
(3)	
(4)	
(5)	
9.36.2.2.	**Foundations**
(1)	
(2)	[F20-OP2.1]
	[F20-OS2.1]
(3)	

Acceptable Solution	Objectives and Functional Statements
9.36.2.3.	**Waterproofing and Dampproofing**
(1)	
9.36.2.4.	**Smoke Alarms**
(1)	
9.36.3.1.	**Buildings for Seasonal Tourist Accommodation or for Rent**
(1)	
9.37.1.1.	**Material Requirements**
(1)	[F20-OP2.1]
	[F20-OS2.1]
9.37.1.2.	**Requirement for Wood Preservative**
(1)	[F80-OH4]
	[F80-OP2.1, OP2.3]
	[F80-OS2.3, OS3.1]
9.37.1.3.	**Exterior Joints**
(1)	[F61-OH1.3]
	[F42-OH2.5]
	[F61-OP2.3]
9.37.2.1.	**Logs**
(1)	
9.37.2.2.	**Attachment of Logs**
(1)	[F61-OH1.3]
	[F42-OH2.5]
	[F61-OP2.3]
9.37.2.3.	**Joining Logs**
(1)	[F22-OP2.5]
	[F22-OS2.5]
9.37.2.4.	**Vertical Logs**
(1)	[F22-OP2.5]
	[F22-OS2.5]
9.37.2.5.	**Plates**
(1)	[F20-OP2.1]
	[F20-OS2.1]
9.37.3.1.	**Support Over Openings**
(1)	[F22-OP2.5]
	[F22-OS2.5]
9.37.3.2.	**Clearance**
(1)	[F21-OP2.4]
	[F21-OS2.4]
9.39.1.1.	**Application**
(1)	
9.39.2.1.	**General**
(1)	
9.39.3.1.	**Other Building Components**
(1)	
9.39.3.2.	**Spatial Separation**
(1)	
9.39.3.3.	**Foundations and Anchorage**
(1)	[F20, F22-OS2.1, OS2.2, OS2.5]
	[F20, F22-OP2.1, OP2.2, OP2.4, OP2.5]
9.39.3.4.	**Proximity to Above Ground Electrical Conductors**
(1)	

Acceptable Solution	Objectives and Functional Statements
9.40.1.1.	**Application**
(1)	
(2)	
(3)	
9.40.1.2.	**Concrete**
(1)	
9.40.1.3.	**Reinforcing Steel**
(1)	[F20, F21-OH4]
	[F20-OP2.1, OP2.4] [F21-OP2.4]
	[F20-OS2.1]
9.40.1.4.	**Slab Construction**
(1)	[F20, F21, F55, F61, F80-OH1.1, OH1.2] [F20, F21, F61, F80-OH1.3] Applies where concrete supports or is used in an environmental separator.
	[F20, F21, F80-OH4]
	[F20-OP2.1, OP2.4] [F21-OP2.3, OP2.4] [F80-OP2.3] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F21, F80-OS2.3] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F21, F80-OS3.1]
(2)	[F20, F21, F55, F61, F80-OH1.1, OH1.2] [F20, F21, F61, F80-OH1.3] Applies where concrete supports or is used in an environmental separator.
	[F20, F21, F80-OH4]
	[F20-OP2.1, OP2.4] [F21-OP2.3, OP2.4] [F80-OP2.3] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F21, F80-OS2.3] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20, F21, F80-OS3.1]
(3)	[F20, F21-OH4]
	[F20-OP2.1, OP2.4] [F21-OP2.4]
	[F20-OS2.1]
(4)	[F22-OP2.5]
	[F22-OS2.5]
(5)	[F61, F62-OH1.1, OH1.2, OH1.3]
	[F61, F62, F80-OP2.3]
	[F61, F62, F80-OS2.3]
	[F30-OS3.1]
9.41.1.1.	**Application**
(1)	
(2)	
(3)	
9.41.2.1.	**Change of Use and Compensating Construction**

Acceptable Solution	Objectives and Functional Statements
(1)	9.5 Applies to the design of areas and spaces in buildings. [F74-OA2] [F70, F71-OH2.3] [F101-OH6] [F30-OS3.1] [F10-OS3.7]
	9.7 Applies to windows and skylights in Part 9 buildings. [F55, F61, F62, F63, F80, F81, F82-OH1.1] [F51, F53, F54, F55, F61, F62, F63, F80, F82-OH1.2] [F61, F62, F63-OH1.3] [F102-OH7] [F42-OP2.3] [F03, F20-OS1.2] [F10-OS1.5] [F20-OS2.1] [F20, F21, F42, F61, F63-OS2.3] [F30-OS3.1] [F10, F30-OS3.7] [F34-OS4.1] [F131-OR2]
	9.10.17 Applies to flame spread limits in Part 9 buildings. [F01, F02-OS1.2] [F01, F02, F05-OS1.5]
	9.31 Applies to plumbing facilities serving Part 9 dwelling units. [F44, F62-OH1.1] [F40, F41, F62-OH1.2, OH1.3] [F70, F71, F72, F80-OH2.1] [F41-OH2.2] [F70, F71, F72, F80, F81-OH2.3] [F01-OS1.1] [F31, F80-OS2.3] [F20-OS3.1] [F23-OS3.4]
	9.32 Applies to ventilation in Part 9 residential occupancies. [F40, F42, F50, F52, F53, F61, F80, F81, F82-OH1.1] [F42, F51, F52, F80, F81-OH1.2] [F42, F80-OH2.5] [F82-OP1.1] [F131-OR2] [F02, F03, F80, F82-OS1.1] [F42, F53, F61, F63-OS2.3] [F40, F43, F44, F50, F53, F81-OS3.4]
	9.34.1 [F01-OS1.1] [F10-OS3.1] [F32, F81-OS3.3] Applies to electrical facilities in Part 9 buildings.
	9.34.2 [F30-OS3.1] Applies to lighting outlets for Part 9 buildings. [F34-OS4.2] Applies to lighting outlets for Part 9 buildings.
	9.34.3 [F30-OS3.1] [F10-OS3.7] Applies to emergency lighting for Part 9 buildings.
(2)	

Acceptable Solution	Objectives and Functional Statements
9.41.2.2.	**Performance Level Evaluation and Compensating Construction**
(1)	[F140-OC]
(2)	
(3)	
(4)	

Table 10
Objectives and Functional Statements Attributed to the Acceptable Solutions in Part 10 of Division B

Acceptable Solution	Objectives and Functional Statements
10.1.1.1.	**Scope**
(1)	
10.1.1.2.	**Change in Major Occupancy**
(1)	
10.1.1.3.	**Definitions**
(1)	
10.2.1.1.	**Classification of Major Occupancy**
(1)	
10.2.1.2.	**Classification According to Construction and Occupancy**
(1)	
10.2.1.3.	**Building Size and Construction**
(1)	
10.3.1.1.	**General**
(1)	3.2.6. Applies to additional requirements for high *buildings* [F03, F06, F12, F13, F82-OP1.2] [F03-OP3.1] [F02, F03, F06, F12, F13, F82-OS1.2] [F02, F03, F05, F06, F10, F11, F12, F82-OS1.5] [F30-OS3.1] [F11, F12-OS3.7]
	3.7. Applies to health requirements for *buildings* [F74-OA2] [F50-OH1.1] [F40, F72-OH2.1] [F70-OH2.2] [F71-OH2.3] [F40, F41-OH2.4] [F101-OH6] [F102-OH7] [F01-OP1.1] [F01-OS1.1] [F20, F30-OS3.1] [F32-OS3.3] [F43, F44-OS3.4]
	3.11. Applies to public pools [F74-OA2] [F50-OH1.1] [F72-OH2.1] [F46, F70-OH2.2] [F40, F41, F45, F71, F122-OH2.3] [F40, F41-OH2.4] [F101-OH6] [F01-OS1.1] [F04-OS1.3] [F03-OS2.1] [F12, F30, F34, F36, F120, F121, F123, F124-OS3.1] [F31-OS3.2] [F32, F34-OS3.3] [F34, F43, F44, F81, F122-OS3.4] [F10, F11, F12, F34, F123-OS3.7]
	3.12. Applies to public spas [F74-OA2] [F46-OH2.2] [F40, F41, F70, F71, F72, F81, F122-OH2.3] [F40, F41-OH2.4] [F11, F12, F13, F30, F34, F36, F81, F120, F121, F123, F124-OS3.1] [F43, F81, F122-OS3.4] [F10, F34, F123-OS3.7]
	9.5. Applies to the design of areas and spaces in *buildings* [F74-OA2] [F70, F71-OH2.3] [F101-OH6] [F30-OS3.1] [F10-OS3.7]

Acceptable Solution	Objectives and Functional Statements
	9.7. Applies to windows and skylights in Part 9 *buildings*. [F55, F61, F62, F63, F80, F81, F82-OH1.1] [F51, F53, F54, F55, F61, F62, F63, F80, F82-OH1.2] [F61, F62, F63-OH1.3] [F102-OH7] [F42-OP2.3] [F03, F20-OS1.2] [F10-OS1.5] [F20-OS2.1] [F20, F21, F42, F61, F63-OS2.3] [F30-OS3.1] [F10, F30-OS3.7] [F34-OS4.1] [F131-OR2]
	9.10.17. Applies to flame spread limits in Part 9 *buildings*. [F01, F02-OS1.2] [F01, F02, F05-OS1.5]
	9.31. Applies to plumbing facilities serving Part 9 dwelling units. [F44, F62-OH1.1] [F40, F41, F62-OH1.2, OH1.3] [F70, F71, F72, F80-OH2.1] [F41-OH2.2] [F70, F71, F72, F80, F81-OH2.3] [F01-OS1.1] [F31, F80-OS2.3] [F20-OS3.1] [F23-OS3.4]
	9.32. Applies to ventilation in Part 9 residential occupancies. [F40, F42, F50, F52, F53, F61, F80, F81, F82-OH1.1] [F42, F51, F52, F80, F81-OH1.2] [F42, F80-OH2.5] [F82-OP1.1] [F131-OR2] [F02, F03, F80, F82-OS1.1] [F42, F53, F61, F63-OS2.3] [F40, F43, F44, F50, F53, F81-OS3.4]
	9.34.1. [F01-OS1.1] [F10-OS3.1] [F32, F81-OS3.3] Applies to electrical facilities in Part 9 *buildings*.
	9.34.2. [F30-OS3.1] Applies to lighting outlets for Part 9 *buildings*. [F34-OS4.2] Applies to lighting outlets for Part 9 *buildings*.
	9.34.3. [F30-OS3.1] [F10-OS3.7] Applies to emergency lighting for Part 9 *buildings*.
10.3.2.1.	**General**
(1)	[F140-OC]
(2)	
10.3.2.2.	**Reduction in Performance Level**
(1)	
(2)	
(3)	
(4)	
(5)	
(6)	
(7)	
(8)	
(9)	
(10)	
(11)	

Acceptable Solution	Objectives and Functional Statements
10.4.1.1.	**Substitution**
(1)	
(2)	
(3)	

Table 11
Objectives and Functional Statements Attributed to the Acceptable Solutions in Part 11 of Division B

Acceptable Solution	Objectives and Functional Statements
11.1.1.1.	**Scope**
(1)	
11.1.1.2.	**Definitions**
(1)	
11.1.2.1.	**Extension, Material Alteration or Repair**
(1)	
11.2.1.1.	**Construction Index and Hazard Index**
(1)	
(2)	
(3)	
11.2.1.2.	**Multiple Occupancies**
(1)	
11.2.1.3.	**Prohibition of Occupancy Combinations**
(1)	[F41-OH2.1]
	[F02, F03-OS1.2] [F10-OS1.5]
11.3.1.1.	**Material Alteration or Repair of a Building System**
(1)	[F140-OC]
11.3.1.2.	**New Building Systems and Extension of Existing Building Systems**
(1)	
11.3.2.1.	**Portion of Extended Buildings**
(1)	
11.3.3.1.	**Basic Renovation**
(1)	
(2)	
11.3.3.2.	**Extensive Renovation**
(1)	
(2)	
11.3.4.1.	**Extension, Material Alteration or Repair**
(1)	
11.3.5.1.	**Existing Septic Tanks**
(1)	
11.4.1.1.	**Performance Level**
(1)	[F140-OC]
(2)	
(3)	
11.4.2.1.	**Structural**
(1)	
11.4.2.2.	**Increase in Occupant Load**
(1)	
(2)	
(3)	
11.4.2.3.	**Change of Major Occupancy**
(1)	
(2)	
(3)	
(4)	
(5)	

Acceptable Solution	Objectives and Functional Statements
11.4.2.4.	**Plumbing**
(1)	
11.4.2.5.	**Sewage Systems**
(1)	
(2)	
(3)	
(4)	
11.4.3.1.	**General**
(1)	
(2)	
(3)	
11.4.3.2.	**Structural**
(1)	[F110-OE] Applies to manure storage tanks
	[F21, F22, F61, F80, F81-OH4]
	[F04-OP1.2]
	[F20-OP2.1, OP2.2, OP2.3, OP2.4, OP2.6] [F21-OP2.1, OP2.2, OP2.4, OP2.5, OP2.6] [F22-OP2.1, OP2.3, OP2.4, OP2.5] [F81-OP2.1, OP2.4] [F82-OP2.3] [F61-OP2.3, OP2.4] [F80-OP2.3, OP2.4, OP2.6]
	[F04-OP3.1]
	[F21-OP4.1, OP4.4] [F20-OP4.3]
	[F04-OS1.2]
	[F20-OS2.1, OS2.2, OS2.3, OS2.4] [F21-OS2.1, OS2.2, OS2.3, OS2.5, OS2.6] [F61-OS2.3] [F80-OS2.3] [F81-OS2.3] [F82-OS2.3]
	[F30-OS3.1] [F43-OS3.4] Applies to manure storage tanks
11.4.3.3.	**Increase in Occupant Load**
(1)	As applied to fire alarm systems in Subsection 3.2.4. [F12, F13, F81, F82-OP1.2] [F02, F03, F11, F12, F13, F81, F82-OS1.2] [F11, F13-OS1.4] [F10, F11, F12, F13, F81, F82-OS1.5] [F11, F12-OS3.7] Applies to voice communication systems.
	As applied to smoke control measures, and at least one elevator to permit transport of fire fighters to all floors in hotels whose floor level is more than 18 m high measured between *grade* and floor level of the top *storey* in Subsection 3.2.6. [F02, F03, F06, F12, F13, F82-OP1.2] [F03-OP3.1] [F02, F03, F06, F12, F13, F82-OS1.2] [F02, F03, F05, F06, F10, F12-OS1.5] [F30-OS3.1]
	As applied to lighting of *exits*, lighting of *access to exits* and emergency lighting in Subsection 3.2.7. [F40-OH2.4] [F12-OH5] Applies to the requirement for a suitably identified shut-off valve outside the *building*. [F01-OP1.1] [F01, F02, F03, F06, F12, F81-OP1.2] [F02-OP3.1] [F12-OS1.1] Applies to the requirement for a suitably identified shut-off valve outside the *building*. [F02, F03, F06, F10, F11, F12, F81-OS1.2] [F02, F03, F06, F10, F11, F12, F81-OS1.5] [F02, F06, F30, F81-OS3.1] [F36-OS3.6] [F10, F11, F12, F81-OS3.7]
	As applied to access to *exit* widths based on *occupant load* in Article 3.3.1.16.

Acceptable Solution	Objectives and Functional Statements
	[F10-OS3.7]
	As applied to door release hardware in Article 3.3.1.12.: [F73-OA1] [F30-OS3.1] [F10, F12-OS3.7]
	As applied to travel distance in Article 3.4.2.4.: .[F10-OS3.7]
	As applied to number of *exits* in Articles 3.4.2.3. and 3.4.2.5.: [F05, F10-OS1.5] [F10-OS3.7]
	As applied to *exit* widths based on *occupant load* in Article 3.4.3.2.: [F12-OP1.2] [F12-OS1.2] [F30-OS3.1] [F10, F12-OS3.7]
	As applied to *exit* signs in Articles 3.4.5.1. and 3.4.5.2.: [F10, F81-OS3.7]
	As applied to door release hardware in Article 3.4.6.15.: [F73-OA1] [F02-OS1.2] [F10, F81-OS1.5] [F10, F81-OS3.7]
	As applied to access to *exit* widths based on *occupant load* in Subsection 9.9.3.: [F30-OS3.1] [F10-OS3.7]
	As applied to *exit* widths based on *occupant load* in Subsection 9.9.3.: [F30-OS3.1] [F10-OS3.7]
	As applied to travel distance in Article 9.9.9.1.: [F10-OS3.7]
	As applied to number of *exits* in Articles 9.9.8.2. and 9.9.9.2.: [F10-OS3.7]
	As applied to *exit* signs in Subsection 9.9.10.: [F73-OA1] [F10-OS1.5] [F10-OS3.7]
	As applied to lighting of *exits*, lighting of *access to exits* and emergency lighting in Article 9.9.11.: [F30-OS3.1] [F10-OS3.7]
	As applied to fire alarm systems in Subsection 9.10.18.: [F02-OS1.2] Applies to a *sprinklered building*. [F03, F11-OS1.2] [F11-OS1.5]
	As applied to smoke alarms in Subsection 9.10.19.: [F11, F81-OS1.4] [F11, F81, F82-OS1.5]
(2)	
(3)	As applied to required ventilation for *buildings* in Sentence 6.2.2.1.(2): [F50-OH1.1]
	As applied to plumbing facilities for *buildings* in Subsection 3.7.4.: [F74-OA2] [F50-OH1.1] [F72-OH2.1] [F70-OH2.2] [F71-OH2.3] [F40-OH2.4] [F101-OH6] [F20, F30-OS3.1]
	As applied to plumbing facilities serving Part 9 *dwelling units* in Article 9.31.1.1.: [F44, F62-OH1.1] [F40, F41, F62-OH1.2, OH1.3] [F70, F71, F72, F80-OH2.1] [F41-OH2.2] [F70, F71, F72, F80, F81-OH2.3] [F01-OS1.1] [F31, F80-OS2.3] [F20-OS3.1] [F23-OS3.4]
11.4.3.4.	**Change in Major Occupancy**

Acceptable Solution	Objectives and Functional Statements
(1)	[F02, F03, F04-OP1.2, OP1.3] Applies to increase in *construction index*. [F02, F04-OP1.2, OP1.3] Applies where the *building* is required to be *sprinklered*. [F02, F03, F04-OS1.2, OS1.3] Applies to increase in *construction index*. [F02, F04-OS1.2, OS1.3] Applies where the *building* is required to be *sprinklered*.
	Applies where an Early Warning system is provided for a Part 3 *building*, in accordance with Subsection 3.2.4.: [F12, F13, F81, F82-OP1.2] [F02, F03, F11, F12, F13, F81, F82-OS1.2] [F11, F13-OS1.4] [F10, F11, F12, F13, F81, F82-OS1.5] [F11, F12-OS3.7] Applies to voice communication systems.
	Applies where an Early Warning system is provided for a Part 9 *building*, in accordance with Subsection 9.10.18.: [F02-OS1.2] Applies to a *sprinklered building*. [F03, F11-OS1.2] [F11-OS1.5]
	Applies where an Early Warning system is provided for a Part 9 *building*, in accordance with Subsection 9.10.19.: [F11, F81-OS1.4] [F11, F81, F82-OS1.5]
(2)	As applied to additional requirements for high *buildings* in Subsection 3.2.6.: [F03, F06, F12, F13, F82-OP1.2] [F03-OP3.1] [F02, F03, F06, F12, F13, F82-OS1.2] [F02, F03, F05, F06, F10, F11, F12, F82-OS1.5] [F30-OS3.1] [F11, F12-OS3.7]
	As applied to health requirements for *buildings* in Section 3.7.: [F74-OA2] [F50-OH1.1] [F40, F72-OH2.1] [F70-OH2.2] [F71-OH2.3] [F40, F41-OH2.4] [F101-OH6] [F102-OH7] [F01-OP1.1] [F01-OS1.1] [F20, F30-OS3.1] [F32-OS3.3] [F43, F44-OS3.4]
	As applied to *public pools* in Section 3.11.: [F74-OA2] [F50-OH1.1] [F72-OH2.1] [F46, F70-OH2.2] [F40, F41, F45, F71, F122-OH2.3] [F40, F41-OH2.4] [F101-OH6] [F01-OS1.1] [F04-OS1.3] [F03-OS2.1] [F12, F30, F34, F36, F120, F121, F123, F124-OS3.1] [F31-OS3.2] [F32, F34-OS3.3] [F34, F43, F44, F81, F122-OS3.4] [F10, F11, F12, F34, F123-OS3.7]
	As applied to *public spas* in Section 3.12.: [F74-OA2] [F46-OH2.2] [F40, F41, F70, F71, F72, F81, F122-OH2.3] [F40, F41-OH2.4] [F11, F12, F13, F30, F34, F36, F81, F120, F121, F123, F124-OS3.1] [F43, F81, F122-OS3.4] [F10, F34, F123-OS3.7]
	As applied to required ventilation for *buildings* in Sentence 6.2.2.1.(2) [F50-OH1.1]
	As applied to Sentence 6.2.3.9.(1): [F40-OH1.1] [F44-OS1.1]
	As applied to Sentence 6.2.4.7.(10): [F40-OH1.1] [F44-OS1.1]
	As applied to Subsection 9.5.1.: [F10-OS3.7]
	As applied to Articles 9.5.3.1. to 9.5.10.1.: [F70, F71-OH2.3] [F101-OH6]

Acceptable Solution	Objectives and Functional Statements
	[F30-OS3.1] [F10-OS3.7]
	As applied to windows and skylights in Part 9 *buildings* in Section 9.7.: [F55, F61, F62, F63, F80, F81, F82-OH1.1] [F51, F53, F54, F55, F61, F62, F63, F80, F82-OH1.2] [F61, F62, F63-OH1.3] [F102-OH7] [F42-OP2.3] [F03, F20-OS1.2] [F10-OS1.5] [F20-OS2.1] [F20, F21, F42, F61, F63-OS2.3] [F30-OS3.1] [F10, F30-OS3.7] [F34-OS4.1] [F131-OR2]
	As applied to flame spread limits in Part 9 *buildings* Subsection 9.10.17.: [F01, F02-OS1.2] [F01, F02, F05-OS1.5]
	As applied to plumbing facilities serving Part 9 *dwelling units* in section 9.31.: [F44, F62-OH1.1] [F40, F41, F62-OH1.2, OH1.3] [F70, F71, F72, F80-OH2.1] [F41-OH2.2] [F70, F71, F72, F80, F81-OH2.3] [F01-OS1.1] [F31, F80-OS2.3] [F20-OS3.1]
	As applied to ventilation in Part 9 *residential occupancies* in Section 9.32.: [F40, F42, F50, F52, F53, F61, F80, F81, F82-OH1.1] [F42, F51, F52, F80, F81-OH1.2] [F42, F80-OH2.5] [F82-OP1.1] [F131-OR2] [F02, F03, F80, F82-OS1.1] [F42, F53, F61, F63-OS2.3] [F40, F43, F44, F50, F53, F81-OS3.4]
	As applied to Subsection 9.34.1.: [F01-OS1.1] [F10-OS3.1] [F32, F81-OS3.3] Applies to electrical facilities in Part 9 *buildings*.
	As applied to Subsection 9.34.2.: [F30-OS3.1] Applies to lighting outlets for Part 9 *buildings*. [F34-OS4.2] Applies to lighting outlets for Part 9 *buildings*.
	As applied to Subsection 9.34.3.: [F30-OS3.1] [F10-OS3.7] Applies to emergency lighting for Part 9 *buildings*.
(3)	As applied to fire alarm systems in Subsection 3.2.4.: [F12, F13, F81, F82-OP1.2] [F02, F03, F11, F12, F13, F81, F82-OS1.2] [F11, F13-OS1.4] [F10, F11, F12, F13, F81, F82-OS1.5] [F11, F12-OS3.7] Applies to voice communication systems.
	As applied to smoke control measures, and at least one elevator to permit transport of fire fighters to all floors in hotels whose floor level is more than 18 m high, measured between *grade* and the floor level of the top *storey* in Subsection 3.2.6.: [F02, F03, F06, F12, F13, F82-OP1.2] [F03-OP3.1] [F02, F03, F06, F12, F13, F82-OS1.2] [F02, F03, F05, F06, F10, F12-OS1.5] [F30-OS3.1]
	As applied to lighting of *exits*, lighting of *access to exits* and emergency lighting in Subsection 3.2.7.: [F40-OH2.4] Applies to the requirement for a suitably identified shut-off valve outside the *building*. [F01-OP1.1] [F01, F02, F03, F06, F12, F81-OP1.2] [F02-OP3.1] [F12-OS1.1] Applies to the requirement for a suitably identified shut-off valve outside the *building*. [F02, F03, F06, F10, F11, F12, F81-OS1.2] [F02, F03, F06, F10, F11, F12, F81-OS1.5] [F02, F06, F30, F81-OS3.1] [F36-OS3.6] [F10, F11, F12, F81-OS3.7]
	As applied to access to *exit* widths based on *occupant load* in Article 3.3.1.16.: [F10-OS3.7]
	As applied to door release hardware in Article 3.3.1.12.:

Acceptable Solution	Objectives and Functional Statements
	[F73-OA1] [F30-OS3.1] [F10, F12-OS3.7]
	As applied to travel distance in Article 3.4.2.4.: [F10-OS3.7]
	As applied to number of *exits* in Articles 3.4.2.3. and 3.4.2.5.: [F05, F10-OS1.5] [F10-OS3.7]
	As applied to *exit* widths based on *occupant load* in Article 3.4.3.2.: [F12-OP1.2] [F12-OS1.2] [F30-OS3.1] [F10, F12-OS3.7]
	As applied to *exit* signs in Articles 3.4.5.1. and 3.4.5.2.: [F10, F81-OS3.7]
	As applied to door release hardware in Article 3.4.6.15.: [F73-OA1] [F02-OS1.2] [F10, F81-OS1.5] [F10, F81-OS3.7]
	As applied to access to *exit* widths based on *occupant load* in Subsection 9.9.3.: [F30-OS3.1] [F10-OS3.7]
	As applied to *exit* widths based on *occupant load* in Subsection 9.9.3.: [F30-OS3.1] [F10-OS3.7]
	As applied to travel distance in Article 9.9.9.1.: [F10-OS3.7]
	As applied to number of *exits* in Articles 9.9.8.2. and 9.9.9.2.: [F10-OS3.7]
	As applied to *exit* signs in subsection 9.9.10.: [F10-OS1.5] [F10-OS3.7] [F73-OA1]
	As applied to lighting of *exits*, lighting of *access to exits* and emergency lighting in Article 9.9.11.: [F30-OS3.1] [F10-OS3.7]
	As applied to fire alarm systems in Subsection 9.10.18.: [F02-OS1.2] Applies to a *sprinklered building*. [F03, F11-OS1.2] [F11-OS1.5]
	As applied to smoke alarms in Subsection 9.10.19.: [F11, F81-OS1.4] [F11, F81, F82-OS1.5]
(4)	As applied to *fire separations* in Article 3.1.3.1.: [F03-OP1.2] [F03-OS1.2]
	As applied to Table 11.4.3.4.B.: [F140-OC]
(5)	
11.4.3.5.	**Plumbing**
(1)	[F140-OC]
	[F20-OE] [F20-OE] Applies to drainage piping. [F20-OE] Applies to underground drainage piping. [F20, F81, F113-OE] [F40-OE] [F44-OE] [F44-OE] Applies to oil interceptors. [F44, F81, F112-OE] [F81-OE] Applies to underground drainage piping.

Acceptable Solution	Objectives and Functional Statements
	[F81, F112-OE] [F111-OE] Applies to drainage systems served by a sewage system.
	[F20-OH1.1] [F20-OH1.1] Applies to vent piping. [F20, F43, F81-OH1.1] [F20, F43, F81-OH1.1] Applies to venting system. [F20, F43, F81-OH1.1] Applies to bell and spigot joints in venting systems. [F20, F81-OH1.1] [F21-OH1.1] [F40-OH1.1] [F40, F41, F50-OH1.1] Applies to the requirement for ventilation. [F40, F81-OH1.1] [F41-OH1.1] [F41, F81-OH1.1] Applies to vent pipes. [F43-OH1.1] [F43, F80, F81-OH1.1] Applies to venting system. [F43, F81-OH1.1] Applies to venting system. [F44, F81-OH1.1] [F80-OH1.1] [F81-OH1.1] [F81-OH1.1] Applies to venting system. [F31-OH1.2] [F20-OH1.3] [F20, F80, F81-OH1.3] [F61-OH1.3] [F61, F80-OH1.3] [F62-OH1.3] [F62, F81-OH1.3] [F80, F81-OH1.3] [F81-OH1.3] Applies to water pipes.
	[F20-OH2.1] [F20-OH2.1] Applies to drainage piping. [F20, F80, F81, F113-OH2.1] [F20, F80, F81, F113-OH2.1] Applies to building sewer. [F20, F80, F81, F113-OH2.1] Applies to drainage system. [F20, F80, F81, F113-OH2.1] Applies to Waste Fittings. [F20, F81-OH2.1] Applies to drainage piping. [F20, F81-OH2.1] Applies to bell and spigot joints in drainage systems. [F21-OH2.1] [F40-OH2.1] [F41, F81-OH2.1] [F43-OH2.1] [F45-OH2.1] [F62-OH2.1] [F62, F70-OH2.1] [F70-OH2.1] [F72-OH2.1] [F80-OH2.1] [F80, F81-OH2.1] Applies to drainage system. [F80, F81, F113-OH2.1] [F80, F81, F113-OH2.1] Applies to drainage system. [F81-OH2.1] [F81-OH2.1] Applies to drainage system. [F81, F113-OH2.1] [F20-OH2.2] [F20-OH2.2] Applies to water piping. [F20, F46, F80, F81-OH2.2] [F20, F46, F80, F81-OH2.2] Applies to water piping.

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Acceptable Solution	Objectives and Functional Statements
	[F20, F46, F80, F81-OH2.2] Applies to Supply Fittings.
	[F20, F46, F81-OH2.2] Applies to water piping.
	[F20, F80, F81-OH2.2]
	[F20, F81-OH2.2]
	[F21-OH2.2]
	[F41, F46-OH2.2]
	[F46-OH2.2]
	[F46-OH2.2] Applies to Water Systems.
	[F46, F70-OH2.2]
	[F46, F70, F81-OH2.2]
	[F46, F80, F81-OH2.2]
	[F46, F80, F81-OH2.2] Applies to water piping.
	[F46, F81-OH2.2]
	[F46, F81-OH2.2] Applies to water piping.
	[F70-OH2.2]
	[F70, F80-OH2.2]
	[F70, F81-OH2.2]
	[F80-OH2.2]
	[F81-OH2.2] Applies to the size of air break.
	[F81-OH2.2] Applies to water service pipe.
	[F81-OH2.2] Applies to private water supply.
	[F81-OH2.2] Applies to water system.
	[F82-OH2.2]
	[F71-OH2.3]
	[F71, F72-OH-2.3] Applies to equipment.
	[F72-OH2.3]
	[F40-OH2.4]
	[F40, F46-OH2.4]
	[F41-OH2.4]
	[F41-OH2.4] Applies to floor drains in garbage rooms.
	[F41, F81-OH2.4]
	[F63-OH2.4]
	[F81-OH2.4]
	[F42-OH2.5]
	[F81-OH2.6] Applies to drainage pipe.
	[F81-OH2.6] Applies to private sewers.
	[F20-OH2.1, OH2.2]
	[F20, F46, F80, F81, F113-OH2.1, OH2.2]
	[F80-OH2.1, OH2.2]
	[F80-OH2.1, OH2.2, OH2.3, OH2.4]
	[F82-OH2.1, OH2.2, OH2.3, OH2.4] Applies to the need for maintenance.
	[F81-OH2.1, OH2.2, OH2.4]
	[F20, F81-OH2.1, OH2.3]
	[F20, F81, F113-OH2.1, OH2.3]
	[F80-OH2.1, OH2.3] Applies to Drainage Systems.
	[F81-OH2.1, OH2.3, OH2.4]
	[F81, F82-OH2.1, OH2.3, OH2.4]
	[F40-OH2.1, OH2.4]
	[F40, F41-OH2.1, OH2.4]
	[F41, F43-OH2.1, OH2.4]
	[F41, F81-OH2.1, OH2.4]
	[F43-OH2.1, OH2.4]
	[F80-OH2.1, OH2.4]
	[F80, F81-OH2.1, OH2.4]
	[F81-OH2.1, OH2.4]
	[F82-OH2.1, OH2.4]
	[F20, F80, F81-OH2.1, OH2.6]

Acceptable Solution	Objectives and Functional Statements
	[F20, F80, F81, F113-OH2.1, OH2.6] [F20, F81-OH2.1, OH2.6] [F81-OH2.2, OH2.4] [F41, F81-OH2.4, OH2.5]
	[F20-OH4]
	[F43-OH5] [F44-OH5] [F44-OH5] Applies to oil interceptors. [F81-OH5]
	[F20-OS2.2, OS2.3]
	[F01-OP1.1] [F01-OP1.1] Applies to oil interceptors. [F01, F40, F81-OP1.1] [F20, F81-OP1.1] [F02, F12, F81-OP1.2] [F12-OP1.4]
	[F61-OP2.3] [F61, F80-OP2.3] [F61, F81-OP2.3] [F62-OP2.3] [F63-OP2.3] [F80-OP2.3] [F81-OP2.3]
	[F20-OP5] [F20, F31, F46, F80, F81-OP5] [F20, F46, F80, F81-OP5] [F20, F46, F80, F81-OP5] Applies to Supply Fittings. [F20, F46, F80, F81-OP5] Applies to water piping. [F20, F46, F80, F81, F113-OP5] [F20, F46, F81-OP5] [F20, F46, F81-OP5] Applies to water piping. [F20, F80, F81-OP5] [F20, F80, F81-OP5] Applies to drainage system. [F20, F80, F81, F113-OP5] [F20, F80, F81, F113-OP5] Applies to drainage system. [F20, F80, F81, F113-OP5] Applies to Waste Fittings. [F20, F81-OP5] [F20, F81-OP5] Applies to drainage system. [F20, F81-OP5] Applies to bell and spigot joints in drainage systems. [F20, F81, F113-OP5] [F21-OP5] [F21, F61, F81-OP5] [F40-OP5] [F46-OP5] [F46, F80, F81-OP5] [F46, F80, F81-OP5] Applies to water piping. [F62-OP5] [F62, F72-OP5] [F72-OP5] [F80-OP5] [F80, F81-OP5] [F80, F81-OP5] Applies to drainage system. [F80, F81, F113-OP5] [F80, F81, F113-OP5] Applies to drainage system. [F81-OP5] [F81-OP5] Applies to water pipes. [F81-OP5] Applies to Drainage Systems.

Acceptable Solution	Objectives and Functional Statements
	[F81, F113-OP5] [F81, F113-OP5] Applies to drainage pipes. [F82-OP5]
	[F01-OS1.1] [F01-OS1.1] Applies to oil interceptors. [F01, F40, F81-OS1.1] [F01, F81-OS1.1] [F20, F81-OS1.1] [F81-OS1.1] [F02, F12, F81-OS1.2] [F12-OS1.4]
	[F20, F81-OS2.1] [F20, F81-OS2.3]
	[F20-OS3.1] [F20, F30, F80-OS3.1] [F30-OS3.1] [F30-OS3.1] Applies to the requirement for lighting. [F80-OS3.1] [F81-OS3.1] [F20, F81-OS3.2] [F31-OS3.2] [F31, F81-OS3.2] [F31, F81-OS3.2] Applies to pipes containing hot water. [F31, F81-OS3.2] Applies to pressure vessels containing hot water. [F81-OS3.2] [F32-OS3.3] [F40, F80-OS3.4] [F43-OS3.4] Applies to equipment. [F44-OS3.4] [F81-OS3.4] [F36-OS3.6]
	[F40-OR1] [F130-OR1]
11.4.3.6.	**Sewage Systems**
(1)	[F81, F110, F111-OE] [F81, F111-OE] [F82-OE] [F82, F110-OE] [F82, F111-OE] [F104, F110, F111-OE] [F110-OE] [F110, F111-OE] [F110, F111, F112-OE] [F110, F112-OE] [F111-OE] [F111, F112-OE] [F111, F113-OE] [F112-OE]
	[F50-OH1.1]
	[F82-OH2.1] [F82, F111-OH2.1] [F104, F110, F111-OH2.1] [F110-OH2.1] [F110, F111-OH2.1] [F110, F111, F112 -OH2.1] [F110, F112-OH2.1] [F111-OH2.1]

Acceptable Solution	Objectives and Functional Statements
	[F111, F112-OH2.1] [F40-OH2.4] [F42-OH2.5] [F113-OH2.6]
	[F81, F110, F111-OH5] [F81, F111-OH5] [F82-OH5] [F82, F110-OH5] [F82, F111-OH5] [F104, F110, F111-OH5] [F110-OH5] [F110, F111-OH5] [F110, F111, F112-OH5] [F110, F112-OH5] [F111-OH5] [F111, F112-OH5] [F111, F113-OH5] [F112-OH5]
	[F101-OH6]
	[F20-OP2.3] [F81-OP2.6]
	[F104, F110, F111-OR2]
	[F20-OS2.1] [F20-OS2.2]
	[F30-OS3.1]
11.5.1.1.	**Compliance Alternatives**
(1)	
(2)	

Table 12
Objectives and Functional Statements Attributed to the Acceptable Solutions in Part 12 of Division B

Acceptable Solution	Objectives and Functional Statements
12.1.1.1.	**Scope**
(1)	
12.1.1.2.	**Application**
(1)	
12.2.1.1.	**Energy Efficiency Design**
(1)	
(2)	[F131-OR2]
(3)	(c) [F131-OR2]
(4)	
(5)	
12.2.1.2.	**Energy Efficiency Design After December 31, 2011**
(1)	
(2)	[F131-OR2]
(3)	[F131-OR2]
(4)	
(5)	
12.2.2.1.	**Motion Sensors**
(1)	
(2)	[F30-OS3.1] [F10-OS3.7]
(3)	[F30-OS3.1] [F10-OS3.7]
12.3.1.1.	**Application**
(1)	
(2)	
12.3.1.2.	**Equipment Efficiency for Buildings of Residential Occupancy**
(1)	[F131-OR2]
12.3.1.3.	**Residential Windows and Sliding Glass Doors**
(1)	
12.3.2.1.	**Required Insulation**
(1)	
(2)	[F51, F63-OH1.1, OH1.2]
	[F131-OR2]
	[F63-OS2.3]
(3)	
(4)	[F131-OR2]
12.3.2.2.	**Elements Acting as a Thermal Bridge**
(1)	[F131-OR2]
(2)	[F131-OR2]
(3)	
12.3.2.3.	**Thermal Resistance Values for Roof and Ceiling Assemblies**
(1)	
12.3.2.4.	**Insulation of Foundation Walls**
(1)	
(2)	[F131-OR2]
(3)	
(4)	[F131-OR2]
(5)	
(6)	[F131-OR2]
(7)	

Acceptable Solution	Objectives and Functional Statements
(8)	[F51, F63-OH1.1, OH1.2]
	[F131-OR2]
(9)	[F51, F63-OH1.1, OH1.2]
	[F131-OR2]
12.3.2.5.	**Enclosed Unheated Space**
(1)	
12.3.2.6.	**Thermal Resistance of Windows**
(1)	[F131-OR2]
(2)	[F131-OR2]
12.3.2.7.	**Minimum Thermal Resistance of Doors**
(1)	[F131-OR2]
(2)	[F131-OR2]
12.3.2.8.	**Doors and Glazing With Electric Space Heating**
(1)	[F131-OR2]
(2)	[F131-OR2]
12.3.2.9.	**Log Wall Construction and Post, Beam and Plank Construction**
(1)	[F131-OR2]
(2)	
(3)	
12.3.3.1.	**Application**
(1)	
12.3.3.2.	**General Requirements**
(1)	
(2)	
(3)	
(4)	
(5)	
(6)	
12.3.3.3.	**Thermal Resistance**
(1)	[F131-OR2]
12.3.3.4.	**Metal Framing Elements Acting as Thermal Bridge**
(1)	[F131-OR2]
12.3.3.5.	**Insulated Thermal Bridges**
(1)	[F131-OR2]
12.3.3.6.	**Reduction of Thermal Resistance**
(1)	
12.3.3.7.	**Thermal Resistance Values for Roof and Ceiling Assemblies**
(1)	
12.3.3.8.	**Reduction in Thermal Resistance Values due to Thermal Inertia**
(1)	
12.3.3.9.	**Foundation Wall Insulation**
(1)	
(2)	[F131-OR2]
(3)	
(4)	[F131-OR2]
(5)	[F131-OR2]
12.3.3.10.	**Enclosed Unheated Space**
(1)	
12.3.3.11.	**Windows and Glazing**
(1)	
(2)	[F131-OR2]

Acceptable Solution	Objectives and Functional Statements
(3)	
(4)	
(5)	
12.3.3.12.	**Doors**
(1)	[F131-OR2]
(2)	
(3)	
12.3.3.13.	**Air Infiltration**
(1)	[F54, F55-OH1.2]
	[F131-OR2]
(2)	[F54, F55-OH1.2]
	[F131-OR2]
(3)	[F54, F55-OH1.2]
	[F131-OR2]
(4)	[F54, F55-OH1.2]
	[F131-OR2]
(5)	
(6)	[F54, F55-OH1.2]
	[F131-OR2]
(7)	
12.3.4.1.	**Application**
(1)	
12.3.4.2.	**Thermal Resistance of the Building Envelope**
(1)	[F131-OR2]
(2)	
(3)	[F131-OR2]
(4)	[F131-OR2]
(5)	[F131-OR2]
12.3.4.3.	**Air Infiltration**
(1)	[F131-OR2] [F54, F55-OH1.2]
12.3.4.4.	**Heating, Ventilating and Air-Conditioning**
(1)	
(2)	
(3)	[F131-OR2]
(4)	[F53, F131-OR2]
(5)	[F131-OR2]
(6)	[F131-OR2]
(7)	[F131-OR2]
(8)	[F51-OH1.2]
	[F131-OR2]
(9)	[F131-OR2]
(10)	[F131-OR2]
(11)	[F131-OR2]
12.3.4.5.	**Ducts, Plenums and Piping**
(1)	[F50-OH1.2]
	[F131-OR2]
(2)	[F50-OH1.2]
	[F131-OR2]
(3)	[F131-OR2]
(4)	[F131-OR2]
(5)	[F131-OR2]

Acceptable Solution	Objectives and Functional Statements
(6)	[F131-OR2]
(7)	[F131-OR2]
12.3.4.6.	**Service Water Heating**
(1)	[F131-OR2]
(2)	[F131-OR2]
(3)	[F131-OR2]
(4)	
(5)	[F131-OR2]
(6)	[F131-OR2]
(7)	[F131-OR2]
(8)	
12.3.4.7.	**Lighting**
(1)	
(2)	
(3)	[F131-OR2]
(4)	[F131-OR2]
(5)	
12.3.4.8.	**Interior Lighting**
(1)	
(2)	
(3)	[F131-OR2]
(4)	
(5)	
(6)	
12.3.4.9.	**Interior Lighting Controls**
(1)	[F131-OR2]
(2)	
(3)	[F131-OR2]
(4)	[F131-OR2]
(5)	[F131-OR2]
(6)	[F131-OR2]
(7)	[F131-OR2]
(8)	[F131-OR2]
(9)	[F131-OR2]
12.3.4.10.	**Exterior Lighting**
(1)	
(2)	
(3)	
(4)	
(5)	[F131-OR2]
(6)	[F131-OR2]
12.3.4.11.	**Exterior Lighting Controls**
(1)	[F131-OR2]
(2)	
(3)	[F131-OR2]
(4)	[F131-OR2]
12.3.4.12.	**Electric Motors**
(1)	[F131-OR2]
12.4.1.1.	**Plumbing Systems**
(1)	

Ministry of Municipal Affairs and Housing
Building and Development Branch

Ontario

2006 Building Code // Supplementary Standards

Supplementary Standard SB-1

Climatic and Seismic Information for Building Design in Ontario

August 15, 2006

Supplementary Standard
SB-1

COMMENCEMENT

Supplementary Standard SB-1 comes into force on the 31st day of December, 2006.

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SB-1 Climatic and Seismic Information for Building Design in Ontario

Introduction

The great diversity of climate in Ontario has a considerable effect on the performance of buildings; consequently, building design must reflect this diversity. This Supplementary Standard briefly describes how climatic design values are computed and provides recommended design data for a number of cities, towns, and smaller populated locations. Through the use of such data, appropriate allowances can be made for climate variations in different localities of Ontario and the 2006 Building Code can be applied provincially.

The climatic design data provided in this Supplementary Standard are based on weather observations collected by the Atmospheric Environment Service, Environment Canada. The climatic design data have been researched and analyzed for the Canadian Commission on Building and Fire Codes by Environment Canada, and appear at the end of this Supplementary Standard in Table 1.2, Design Data for Selected Locations in Ontario.

As it is not practical to list values for all municipalities in Ontario, recommended climatic design values for locations not listed can be obtained by contacting the Atmospheric Environment Service, Environment Canada, 4905 Dufferin Street, Downsview, Ontario M3H 5T4, (416) 739-4365.

The information on seismic hazard in spectral format has been provided by the Geological Survey of Canada of Natural Resources Canada. Information for municipalities not listed may be obtained through the Natural Resources Canada Web site at www.EarthquakesCanada.ca, or by writing to the Geological Survey of Canada at 7 Observatory Crescent, Ottawa, Ontario KIA OY3, or at P.O. Box 6000, Sidney, B.C. V8L 4132.

General

The choice of climatic elements tabulated in this Supplementary Standard and the form in which they are expressed have been dictated largely by the requirements for specific values in several sections of the 2006 Building Code. These elements include the Ground Snow Loads, Wind Pressures, Design Temperatures, Heating Degree-Days, One-Day and 15-Minute Rainfalls, the Annual Total Precipitation values and Seismic Data. The following notes briefly explain the significance of these particular elements in building design, and indicate which weather observations were used and how they were analyzed to yield the required design values.

In Table 1.2, Design Data for Selected Locations in Ontario, design weather recommendations and elevations are listed for over 220 locations, which have been chosen based on a variety of reasons. Many incorporated cities and towns with significant populations are included unless located close to larger cities. For sparsely populated areas, many smaller towns and villages are listed. Other locations have been added to the list when the demand for climatic design recommendations at these sites has been significant. The named locations refer to the specific latitude and longitude defined by the Gazetteer of Canada (Natural Resources Canada), available from Publishing and Depository Services Canada, Public Works and Government Services Canada, Ottawa, Ontario KIA OS5.

Almost all of the weather observations used in preparing Table 1.2 were, of necessity, observed at inhabited locations. To estimate design values for arbitrary locations, the observed or computed values for the weather stations were mapped and interpolated appropriately. Where possible, adjustments have been applied for the influence of elevation and known topographical effects. Such influences include the tendency of cold air to collect in depressions, for precipitation to increase with elevation, and for generally stronger winds near large bodies of water.

Since interpolation from the values in Table 1.2 to other locations may not be valid due to local and other effects, Environment Canada will provide climatic design element recommendations for locations not listed in Table 1.2. Local effects are particularly significant in mountainous areas, where the values apply only to populated valleys and not to the mountain slopes and high passes, where very different conditions are known to exist.

Changing and Variable Climates

Climate is not static. At any location, weather and climatic conditions vary from season to season, year to year, and over longer time periods (climate cycles). This has always been the case. When estimating climatic design loads, this variability can be considered using appropriate statistical analysis, data records spanning sufficient periods, and meteorological judgement. The analysis generally assumes that the past climate will be representative of the future climate.

Past and ongoing modifications to atmospheric chemistry (from greenhouse gas emissions and land use changes) are expected to alter most climatic regimes in the future. As a result, it can no longer be safely assumed that the climate of the past few decades will be a sufficient guide to the climate of the next few decades. While average climatic conditions may be changing, the frequency and magnitude of extreme climatic events may also be changing in unknown ways. Although consensus is emerging on the long-term trends for some climatic elements, there is no agreement as yet on the changes expected in climatic variability.

January Design Temperatures

A building and its heating system should be designed to maintain the inside temperature at some pre-determined level. To achieve this, it is necessary to know the most severe weather conditions under which the system will be expected to function satisfactorily. Failure to maintain the inside temperature at the pre-determined level will not usually be serious if the temperature drop is not great and if the duration is not long. The outside conditions should, therefore, not be the most severe in many years, but should be the somewhat less severe conditions that are occasionally but not greatly exceeded.

The January design temperatures are based on an analysis of January air temperatures only. Wind and solar radiation also affect the inside temperature of most buildings and may need to be considered for energy-efficient design.

The January design temperature is defined as the lowest temperature at or below which only a certain small percentage of the hourly outside air temperatures in January occur. In the past, stations with records from all or part of the period 1951-66 formed the basis for calculation of the 2.5 and 1% January temperatures. Where necessary, the data were adjusted for consistency. Since most of the temperatures were observed at airports, design values for the core areas of large cities could be 1 or 2°C milder, although the values for the fringe areas are probably about the same as for the airports. No adjustments were made for this urban heat island effect. The design values for the next 20 to 30 years probably will differ from these tabulated values due to year-to-year climate variability and global climate change resulting from human modifications to atmospheric chemistry.

A review of the design temperatures was undertaken for the 1997 issue of this Supplementary Standard using hourly temperature observations from stations for the length of record up to 1993. Where needed, hourly temperatures were supplemented with correlated record minimum temperatures from long-term stations. The results from the recent analysis indicated reasonable consistency with the previous recommendations. Consequently, the January design temperatures remain unchanged from previous editions of the Building Code.

The 2.5% January design temperature is the value ordinarily used in the design of heating systems. In special cases, when the control of inside temperature is more critical, the 1% value may be used. Other temperature-dependent climatic design parameters may be considered for future issues of this document.

July Design Temperatures

A building and its cooling and dehumidifying system should be designed to maintain the inside temperature and humidity at certain pre-determined levels. To achieve this, it is necessary to know the most severe weather conditions under which the system is expected to function satisfactorily. Failure to maintain the inside temperature and humidity at the pre-determined levels will usually not be serious if the increases in temperature and humidity are not great and the duration is not long. The outside conditions used for design should, therefore, not be the most severe in many years, but should be the somewhat less severe conditions that are occasionally but not greatly exceeded.

The summer design temperatures in this Supplementary Standard are based on an analysis of July air temperatures and humidities. Wind and solar radiation also affect the inside temperature of most buildings and may, in some cases, be more important than the outside air temperature. More complete summer and winter design information can be obtained from Environment Canada.

In the past, two datasets formed the basis for calculation of the July 2.5% dry-bulb temperatures. The first dataset was based on temperature frequency distributions for stations and an empirical relationship between design temperatures and the mean annual maximum temperature. The second dataset consisted of hourly data summaries for stations based on records from 1957 to 1966. Results from the two datasets were averaged and adjusted for consistency. The July 2.5% wet-bulb temperatures were obtained in a similar way, using the two datasets, but without the use of an empirical relationship for the first dataset.

A review of the July design temperatures was undertaken for the 1997 issue of this Supplementary Standard. Design dry-bulb temperatures were analyzed using hourly temperature observations from stations for the length of record up to 1993. Where needed, hourly dry-bulb temperatures were supplemented with correlated record maximum temperatures from long-term stations. The July 2.5% coincident wet-bulb temperatures were obtained by averaging wet-bulb temperatures for all hours when the dry-bulb temperature was within 0.2°C of the July design dry-bulb temperature. A comparison of the results indicated reasonable consistency for design dry-bulb temperatures but some differences for design wet-bulb temperatures that will be investigated for future issues. The July design temperatures remain unchanged for this issue.

Heating Degree-Days

The rate of consumption of fuel or energy required to keep the interior of a small building at 21°C when the outside air temperature is below 18°C is roughly proportional to the difference between 18°C and the outside temperature. Wind speed, solar radiation, the extent to which the building is exposed to these elements and the internal heat sources also affect the heat required and may have to be considered for energy-efficient design. For average conditions of wind, radiation, exposure, and internal sources, however, the proportionality with the temperature difference generally still holds.

Since the fuel required is also proportional to the duration of the cold weather, a convenient method of combining these elements of temperature and time is to add the differences between 18°C and the mean temperature for every day in the year when the mean temperature is below 18°C. It is assumed that no heat is required when the mean outside air temperature for the day is 18°C or higher.

Although more sophisticated computer simulations using other forms of weather data have now almost completely replaced degree-day-based calculation methods for estimating annual heating energy consumption, degree-days remain a useful indicator of relative severity of climate and can form the basis for certain climate-related code requirements.

The degree-days below 18°C have been computed day by day from stations for the length of record available from the period 1961 to 1990. The average annual degree-day values were then interpolated from analyzed maps. When observations with 20 years or more of record were available, recommendations for those locations were weighted towards the observed value.

A difference of only one Celsius degree in the mean annual temperature will cause a difference of 250 to 350 in the Celsius degree-days. Since differences of 0.5 of a Celsius degree in the mean annual temperature are quite likely to occur between two stations in the same town, heating degree-days cannot be relied on to an accuracy of less than about 100 degree-days.

Heating degree-day values for the core areas of larger cities can be 200 to 400 degree-days less (warmer) than for the surrounding fringe areas. The observed degree-days, which are based on daily temperature observations, are often most representative of rural settings or the fringe areas of cities.

Snow Loads

The roof of a building should be able to support the greatest weight of snow that is likely to accumulate on it in many years. Some observations of snow on roofs have been made in Canada, but not enough to form the basis for estimating roof snow loads throughout the country. Similarly, observations of the weight, or water equivalent, of the snow on the ground have not been available in digital form in the past. The observations of roof loads and water equivalents are very useful, as noted below, but the measured depth of snow on the ground is used to provide the basic information for a consistent set of snow loads.

The estimation of the design snow load on a roof from snow depth observations involves the following steps:

1. The depth of snow on the ground, which has an annual probability of exceedance of 1-in-50, is computed.
2. The appropriate unit weight is selected and used to convert snow depth to loads, S_s.
3. The load, S_r, which is due to rain falling on the snow, is computed.
4. Because the accumulation of snow on roofs is often different from that on the ground, adjustments are applied to the ground snow load to provide a design snow load on a roof.

The annual maximum depth of snow on the ground has been assembled from stations for which data has been recorded by the Atmospheric Environment Service (AES). The period of record used varied from station to station, ranging from 7 to 38 years. These data were analyzed using a Gumbel extreme value distribution fitted using the method of moments(1) as reported by Newark et al.(2) The resulting values are the snow depths, which have a probability of 1-in-50 of being exceeded in any one year.

The unit weight of old snow generally ranges from 2 to 5 kN/m^3, and it is usually assumed in Canada that 1 kN/m^3 is the average for new snow. Average unit weights of the seasonal snow pack have been derived for different regions across the country(3) and an appropriate value has been assigned to each weather station. Typically, the values average 2.01 kN/m^3 east of the continental divide (except for 2.94 kN/m^3 north of the treeline), and range from 2.55 to 4.21 kN/m^3 west of the divide. The product of the 1-in-50 snow depth and the average unit weight of the seasonal snow pack at a station is converted to the snow load (SL) in units of kilopascals (kPa).

Except for the mountainous areas of western Canada, the values of the ground snow load at AES stations were normalized assuming a linear variation of the load above sea level in order to account for the effects of topography. They were then smoothed using an uncertainty-weighted moving-area average in order to minimize the uncertainty due to snow depth sampling errors and site-specific variations. Interpolation from analyzed maps of the smooth normalized values yielded a value for each location in Table 1.2, which could then be converted to the listed code values (S_s) by means of an equation in the form:

$$S_s = \text{smooth normalized SL} + bZ$$

where b is the assumed rate of change of SL with elevation at the location and Z is the location's elevation above mean sea level (MSL). Although they are listed in Table 1.2 of Design Data to the nearest tenth of a kilopascal, values of S_s typically have an uncertainty of about 20%. Areas of sparse data in northern Canada were an exception to this procedure. In these regions, an analysis was made of the basic SL values. The effects of topography, variations due to local climates, and smoothing were all subjectively assessed. The values derived in this fashion were used to modify those derived objectively.

Tabulated values cannot be expected to indicate all the local differences in S_s. For this reason, especially in complex terrain areas, values should not be interpolated from Table 1.2 for unlisted locations. The values of S_s in Table 1.2 apply for the elevation and the latitude and longitude of the location, as defined by the Gazetteer of Canada. Values at other locations can be obtained from Environment Canada.

The heaviest loads frequently occur when the snow is wetted by rain, thus the rain load, S_r, was estimated to the nearest 0.1 kPa and is provided in Table 1.2. When values of S_r are added to S_s, this provides a 1-in-50-year estimate of the combined ground snow and rain load. The values of S_r are based on an analysis from weather station values of the 1-in-50-year one-day maximum rain amount. This return period is appropriate because the rain amounts correspond approximately to the joint frequency of occurrence of the one-day rain on maximum snow packs. For the purpose of estimating rain on snow, the individual observed one-day rain amounts were constrained to be less than or equal to the snow pack water equivalent, which was estimated by a snow pack accumulation model reported by Bruce and Clark.(4)

The results from surveys of snow loads on roofs indicate that average roof loads are generally less than loads on the ground. The conditions under which the design snow load on the roof may be taken as a percentage of the ground snow load are given in Subsection 4.1.6. of Division B of the Building Code. The Code also permits further decreases in design snow loads for steeply sloping roofs, but requires substantial increases for roofs where snow accumulation may be more rapid due to such factors as drifting. Recommended adjustments are given in the User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B).

Annual Total Precipitation

Total precipitation is the sum in millimetres of the measured depth of rainwater and the estimated or measured water equivalent of the snow (typically estimated as 0.1 of the measured depth of snow, since the average density of fresh snow is about 0.1 that of water).

The average annual total precipitation amounts in Table 1.2 have been interpolated from an analysis of precipitation observations from stations for the 30-year period from 1961 to 1990.

Annual Rainfall

The total amount of rain that normally falls in one year is frequently used as a general indication of the wetness of a climate, and is therefore included in this Supplementary Standard.

Rainfall Intensity

Roof drainage systems are designed to carry off rainwater from the most intense rainfall that is likely to occur. A certain amount of time is required for the rainwater to flow across and down the roof before it enters the gutter or drainage system. This results in the smoothing out of the most rapid changes in rainfall intensity. The drainage system, therefore, need only cope with the flow of rainwater produced by the average rainfall intensity over a period of a few minutes, which can be called the concentration time.

In Canada, it has been customary to use the 15-minute rainfall that will probably be exceeded on an average of once in 10 years. The concentration time for small roofs is much less than 15 minutes and hence the design intensity will be exceeded more frequently than once in 10 years. The safety factors in Part 7 of Division B of the Building Code will probably reduce the frequency to a reasonable value and, in addition, the occasional failure of a roof drainage system will not be particularly serious in most cases.

The rainfall intensity values tabulated in previous editions of this information were based on measurements of the annual maximum 15-minute rainfalls at stations with 7 or more years of record. They were the 15-minute rainfalls that would be exceeded once in 10 years on average, or the values that had 1 chance in 10 of being exceeded in any one year. The values were analyzed using a Gumbel extreme value distribution.(5)

It is very difficult to estimate the pattern of rainfall intensity in mountainous areas, where precipitation is extremely variable and rainfall intensity can be much greater than in other types of areas. Many of the observations for these areas were taken at locations in valley bottoms or in extensive, fairly level areas.

One-Day Rainfall

If for any reason a roof drainage system becomes ineffective, the accumulation of rainwater may be great enough in some cases to cause a significant increase in the load on the roof. In previous editions of this information, it had been common practice to use the maximum one-day rainfall ever observed for estimating the additional load. Since the length of record for weather stations in Canada is quite variable, the maximum one-day rainfall amounts in previous editions often reflected the variable length of record at nearby stations as much as the climatology. As a result, the maximum values often differed greatly within relatively small areas where little difference should be expected. The current values have been standardized to represent the one-day rainfall amounts that have 1 chance in 50 of being exceeded in any one year or the 1-in-50-year return value one-day rainfalls.

The one-day rainfall values in Table 1.2 were based on measurements of the annual maximum one-day rainfalls for stations with 10 years or more of record. These 1-in-50-year values were obtained using a Gumbel extreme value distribution fitted using the method of moments.(1)

Rainfall frequency observations can vary considerably over time and space. This is especially true for mountainous areas, where elevation effects can be significant. In other areas, small scale intense storms or local influences can produce significant spatial variability in the data. As a result, the analysis incorporates some spatial smoothing.

Driving Rain Wind Pressure (DRWP)

The presence of rainwater on the face of a building, with or without wind, must be addressed in the design and construction of the building envelope so as to minimize the entry of water into the assembly. Wind pressure on the windward faces of a building will promote the flow of water through any open joints or cracks in the facade.

Driving rain wind pressure (DRWP) is the wind load that is coincident with rain, measured or calculated at a height of 10 m. The values provided in Table 1.2 represent the loads for which there is 1 chance in 5 of being reached or exceeded in any one year, or a probability of 20% within any one year. Approximate adjustments for height can be made using the values for C_e given in Sentence 4.1.7.1.(5) of Division B as a multiplier.

Because of inaccuracies in developing the DRWP values related to the averaging of extreme wind pressures, the actual heights of recording anemometers, and the use of estimated rather than measured rainfall values, the values are considered to be higher than actual loads.(9) Thus the actual probability of reaching or exceeding the DRWP in a particular location is less than 20% per year and these values can be considered to be conservative.

DRWP can be used to determine the height to which wind will drive rainwater up enclosed vertical conduits. This provides a conservative estimate of the height needed for fins in window extrusions and end dams on flashings to control water ingress. This height can be calculated as:

$$\text{height of water, mm} = \text{DRWP} / 10, \text{Pa}$$

Note that the pressure difference across the building envelope may be augmented by internal pressures induced in the building interior by the wind. These additional pressures can be estimated using the information provided in the Commentary entitled Wind Load and Effects of the User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B).

Wind Effects

All structures need to be designed to ensure that the main structural system and all secondary components, such as cladding and appurtenances, will withstand the pressures and suctions caused by the strongest wind likely to blow at that location in many years. Some flexible structures, such as tall buildings, slender towers and bridges, also need to be designed to minimize excessive wind-induced oscillations or vibrations.

At any time, the wind acting upon a structure can be treated as a mean or time-averaged component and as a gust or unsteady component. For a small structure, which is completely enveloped by wind gusts, it is only the peak gust velocity that needs to be considered. For a large structure, the wind gusts are not well correlated over its different parts and the effects of individual gusts become less significant. The User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B) evaluates the mean pressure acting on a structure, provide appropriate adjustments for building height and exposure and for the influence of the surrounding terrain and topography (including wind speed-up for hills), and then incorporate the effects of wind gusts by means of the gust factor, which varies according to the type of structure and the size of the area over which the pressure acts.

The wind speeds and corresponding velocity pressures used in the Code are regionally representative or reference values. The reference wind speeds are nominally one-hour averages of wind speeds representative of the 10 m height in flat open terrain corresponding to Exposure A or open terrain in the terminology of the User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B). The reference wind speeds and wind velocity pressures are based on long-term wind records observed at a large number of weather stations across Canada.

In the past, reference wind velocity pressures in the Code have been calculated from hourly averaged wind speed observations measuring the number of miles of wind passing a wind anemometer cup in one hour. The pressures derived from these measurements were representative of true hourly wind pressures. When wind pressures were last calculated in the early 1960s, the hourly averaged wind speeds were the records most commonly available for statistical analysis. Since that time, the majority of the principal observation stations, including the major airports, have converted their observation programs to aviation-type wind speed measurements or spot readings of wind speed.(5) These one-minute averaged wind speeds (later converted to two-minute averages) were observed just before the hour. True one-hour averaged wind speed records from stations for periods from 10 to 22 years formed the basis for most of the wind pressures provided in Table 1.2. The wind velocity pressures, q, were calculated in Pascals using the following equation:

$$q = \tfrac{1}{2} \rho V^2$$

where ρ is an average air density for the windy months of the year and V is wind speed in metres per second. While air density depends on both air temperature and atmospheric pressure, the density of dry air at 0°C and standard atmospheric pressure of 1.2929 kg/m^3 was used as an average value for the wind pressure calculations. As explained by Boyd(6), this value is within 10% of the monthly average air densities for most of Canada in the windy part of the year.

Hourly wind speeds that have 1 chance in 10 and 50* of being exceeded in any one year were analyzed using the Gumbel extreme value distribution fitted using the method of moments with correction for sample size. Values of the 1-in-30-year wind speeds for locations in Table 1.2 were estimated from a mapping analysis of wind speeds. The 1-in-10- and 1-in-50-year speeds were then computed from the 1-in-30-year speeds using a map of the dispersion parameter that occurs in the Gumbel analysis.(1)

Table 1.1 has been arranged to give pressures to the nearest one-hundredth of a kPa and their corresponding wind speeds. The value of "q" in kPa is assumed to be equal to 0.00064645 V^2, where V is given in m/s.

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* Wind speeds that have a one-in-"n"-year chance of being exceeded in any year can be computed from the one-in-10 and one-in-50 return values in Table 1.2 using the following equation:

$$V_{1/n} = \frac{1}{1.4565} \left\{ V_{1/50} + 0.4565\, V_{1/10} + \frac{V_{1/50} - V_{1/10}}{1.1339} \times \ln \frac{-0.0339}{\ln(1 - 1/n)} \right\}$$

Table 1.1
Wind Speeds

q kPa	V m/s	q kPa	V m/s	q kPa	V m/s	q kPa	V m/s
0.15	15.2	0.53	28.6	0.91	37.5	1.29	44.7
0.16	15.7	0.54	28.9	0.92	37.7	1.30	44.8
0.17	16.2	0.55	29.2	0.93	37.9	1.31	45.0
0.18	16.7	0.56	29.4	0.94	38.1	1.32	45.2
0.19	17.1	0.57	29.7	0.95	38.3	1.33	45.4
0.2	17.6	0.58	30	0.96	38.5	1.34	45.5
0.21	18	0.59	30.2	0.97	38.7	1.35	45.7
0.22	18.4	0.6	30.5	0.98	38.9	1.36	45.9
0.23	18.9	0.61	30.7	0.99	39.1	1.37	46
0.24	19.3	0.62	31.0	1.00	39.3	1.38	46.2
0.25	19.7	0.63	31.2	1.01	39.5	1.39	46.4
0.26	20.1	0.64	31.5	1.02	39.7	1.4	46.5
0.27	20.4	0.65	31.7	1.03	39.9	1.41	46.7
0.28	20.8	0.66	32	1.04	40.1	1.42	46.9
0.29	21.2	0.67	32.2	1.05	40.3	1.43	47
0.3	21.5	0.68	32.4	1.06	40.5	1.44	47.2
0.31	21.9	0.69	32.7	1.07	40.7	1.45	47.4
0.32	22.2	0.7	32.9	1.08	40.9	1.46	47.5
0.33	22.6	0.71	33.1	1.09	41.1	1.47	47.7
0.34	22.9	0.72	33.4	1.1	41.3	1.48	47.8
0.35	23.3	0.73	33.6	1.11	41.4	1.49	48
0.36	23.6	0.74	33.8	1.12	41.6	1.5	48.2
0.37	23.9	0.75	34.1	1.13	41.8	1.51	48.3
0.38	24.2	0.76	34.3	1.14	42	1.52	48.5
0.39	24.6	0.77	34.5	1.15	42.2	1.53	48.6
0.4	24.9	0.78	34.7	1.16	42.4	1.54	48.8
0.41	25.2	0.79	35.0	1.17	42.5	1.55	49.0
0.42	25.5	0.8	35.2	1.18	42.7	1.56	49.1
0.43	25.8	0.81	35.4	1.19	42.9	1.57	49.3
0.44	26.1	0.82	35.6	1.2	43.1	1.58	49.4
0.45	26.4	0.83	35.8	1.21	43.3	1.59	49.6
0.46	26.7	0.84	36	1.22	43.4	1.6	49.7
0.47	27	0.85	36.3	1.23	43.6	1.61	49.9
0.48	27.2	0.86	36.5	1.24	43.8	1.62	50.1
0.49	27.5	0.87	36.7	1.25	44.0	1.63	50.2
0.50	27.8	0.88	36.9	1.26	44.1	1.64	50.4
0.51	28.1	0.89	37.1	1.27	44.3	1.65	50.5
0.52	28.4	0.9	37.3	1.28	44.5	1.66	50.7
Column 1	2	3	4	5	6	7	8

Seismic Hazard

The parameters used to represent seismic hazard for specific geographical locations are the 5%-damped horizontal spectral acceleration values for 0.2, 0.5, 1.0, and 2.0 second periods and the horizontal Peak Ground Acceleration value that have a 2% probability of being exceeded in 50 years. The four spectral parameters are deemed sufficient to define spectra closely matching the shape of the Uniform Hazard Spectra (UHS). Hazard values are 50th percentile (median) values based on a statistical analysis of the earthquakes that have been experienced in Canada and adjacent regions.(7&8) The median was chosen over the mean because the mean is affected by the amount of epistemic uncertainty incorporated into the analysis. It is the view of the Geological Survey of Canada and the members of the Canadian National Committee on Earthquake Engineering that the estimation of the epistemic uncertainty is still too incomplete to adopt into the Code.

Further details regarding the representation of seismic hazard can be found in the Commentary on Design for Seismic Effects in the User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B).

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Table 1.2
Design Data for Selected Locations in Ontario

Location	Design Temperature				Degree Days Below 18°C	15 Min Rainfall, mm	One Day Rainfall, 1/50, mm	Annual Rainfall, mm	Annual Total Precipitation, mm	Driving Rain Wind Pressures, Pa, 1/5	Snow Load, kPa, 1/50		Hourly Wind Pressures, kPa		Seismic Data				
	January		July 2.5%										1/10	1/50	$S_a(0.2)$	$S_a(0.5)$	$S_a(1.0)$	$S_a(2.0)$	PGA
	2.5%, °C	1%, °C	Dry, °C	Wet, °C							S_s	S_r							
Ailsa Craig	-17	-19	30	23	4000	25	103	800	950	180	2.2	0.4	0.40	0.55	0.16	0.082	0.044	0.012	0.092
Ajax	-20	-22	30	23	4000	23	92	760	825	160	1.0	0.4	0.43	0.57	0.22	0.110	0.058	0.015	0.120
Alexandria	-24	-26	30	23	4600	28	103	800	975	160	2.4	0.4	0.30	0.40	0.68	0.330	0.140	0.046	0.420
Alliston	-23	-25	29	23	4400	28	113	690	875	120	2.0	0.4	0.22	0.33	0.17	0.092	0.048	0.013	0.087
Almonte	-26	-28	30	23	4850	25	86	730	800	140	2.5	0.4	0.30	0.41	0.58	0.280	0.120	0.039	0.370
Armstrong	-39	-42	28	21	7050	23	97	525	725	100	2.7	0.4	0.21	0.27	0.12	0.056	0.023	0.006	0.059
Arnprior	-27	-29	30	23	4800	23	86	630	775	140	2.5	0.4	0.27	0.37	0.64	0.310	0.130	0.043	0.400
Atikokan	-34	-37	29	22	6100	25	103	570	760	100	2.4	0.3	0.21	0.27	0.12	0.056	0.023	0.006	0.059
Aurora	-21	-23	30	23	4300	28	108	700	800	140	2	0.4	0.30	0.44	0.19	0.100	0.052	0.014	0.100
Bancroft	-27	-29	29	22	4900	25	92	720	900	100	3.1	0.4	0.23	0.32	0.26	0.150	0.071	0.022	0.130
Barrie	-24	-26	29	22	4600	28	97	700	900	120	2.5	0.4	0.21	0.33	0.16	0.094	0.049	0.014	0.076
Barriefield	-22	-24	27	23	4250	23	113	780	950	160	2.1	0.4	0.35	0.47	0.29	0.160	0.083	0.023	0.160
Beaverton	-24	-26	30	22	4550	28	108	720	950	120	2.2	0.4	0.24	0.36	0.16	0.100	0.053	0.015	0.078
Belleville	-22	-24	29	23	4100	23	103	760	850	180	1.7	0.4	0.32	0.43	0.26	0.140	0.073	0.020	0.140
Belmont	-17	-19	30	23	4050	25	97	850	950	180	1.7	0.4	0.35	0.51	0.20	0.098	0.048	0.013	0.130
Big Trout Lake	-38	-40	25	20	7650	13	92	400	600	150	3.2	0.2	0.33	0.42	0.12	0.056	0.023	0.006	0.059
CFB Borden	-23	-25	29	22	4550	28	113	690	875	120	2.2	0.4	0.21	0.33	0.16	0.090	0.048	0.013	0.081
Bracebridge	-26	-28	29	22	4850	25	103	830	1050	120	3.1	0.4	0.26	0.35	0.18	0.110	0.053	0.016	0.078
Bradford	-23	-25	30	23	4400	28	108	680	800	120	2.1	0.4	0.24	0.36	0.18	0.097	0.050	0.014	0.093
Brampton	-19	-21	30	23	4250	28	119	720	820	140	1.3	0.4	0.32	0.44	0.26	0.120	0.052	0.015	0.180
Brantford	-17	-19	30	23	3950	23	103	780	850	160	1.3	0.4	0.31	0.40	0.24	0.120	0.052	0.014	0.160
Brighton	-21	-23	29	23	4200	23	97	760	850	160	1.6	0.4	0.42	0.54	0.25	0.130	0.068	0.018	0.140
Brockville	-23	-25	29	23	4275	25	103	770	975	180	2.2	0.4	0.32	0.44	0.40	0.200	0.100	0.030	0.220
Burk's Falls	-26	-28	29	21	5100	25	103	810	1010	120	2.7	0.4	0.26	0.35	0.21	0.120	0.057	0.018	0.110
Burlington	-17	-19	31	23	3775	23	103	770	850	160	0.9	0.4	0.36	0.46	0.36	0.180	0.063	0.020	0.270
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Table 1.2 (Cont'd)
Design Data for Selected Locations in Ontario

Location	Design Temperature				Degree Days Below 18°C	15 Min Rainfall, mm	One Day Rainfall, 1/50, mm	Annual Rainfall, mm	Annual Total Precipitation, mm	Driving Rain Wind Pressures, Pa, 1/5	Snow Load, kPa, 1/50		Hourly Wind Pressures, kPa		Seismic Data				
	January		July 2.5%																
	2.5% °C	1% °C	Dry °C	Wet °C							S_s	S_r	1/10	1/50	$S_a(0.2)$	$S_a(0.5)$	$S_a(1.0)$	$S_a(2.0)$	PGA
Cambridge	-18	-20	29	23	4150	25	113	800	890	160	1.6	0.4	0.26	0.35	0.22	0.110	0.050	0.013	0.140
Campbellford	-23	-26	30	23	4450	25	97	730	850	160	1.7	0.4	0.29	0.41	0.23	0.130	0.067	0.019	0.120
Cannington	-24	-26	30	23	4550	28	108	740	950	120	2.2	0.4	0.24	0.36	0.17	0.100	0.054	0.015	0.081
Carleton Place	-25	-27	30	23	4800	25	86	730	850	160	2.5	0.4	0.30	0.41	0.52	0.250	0.110	0.036	0.340
Cavan	-22	-25	30	23	4500	28	97	740	850	140	2.0	0.4	0.31	0.44	0.20	0.120	0.060	0.017	0.100
Centralia	-17	-19	30	23	4100	25	103	820	1000	180	2.3	0.4	0.37	0.53	0.14	0.080	0.043	0.011	0.081
Chapleau	-35	-38	27	21	6200	23	97	530	850	80	4.0	0.4	0.19	0.28	0.12	0.058	0.029	0.009	0.059
Chatham	-16	-18	31	24	3750	28	103	800	850	180	1.0	0.4	0.32	0.43	0.20	0.095	0.044	0.012	0.130
Chesley	-19	-21	29	22	4500	28	103	810	1125	140	2.8	0.4	0.33	0.48	0.13	0.077	0.041	0.011	0.063
Clinton	-17	-19	29	23	4150	23	103	810	1000	160	2.6	0.4	0.37	0.53	0.13	0.075	0.041	0.011	0.065
Coboconk	-25	-27	29	22	4750	25	108	740	950	120	2.5	0.4	0.26	0.35	0.18	0.110	0.056	0.016	0.080
Cobourg	-21	-23	30	23	4100	23	97	760	825	160	1.2	0.4	0.46	0.59	0.24	0.120	0.065	0.017	0.130
Cochrane	-34	-36	29	21	6400	20	86	575	875	80	2.8	0.3	0.26	0.35	0.21	0.100	0.046	0.014	0.150
Colborne	-21	-23	29	23	4100	23	86	760	850	160	1.6	0.4	0.44	0.56	0.24	0.130	0.067	0.018	0.140
Collingwood	-22	-24	29	22	4300	28	103	720	950	160	2.7	0.4	0.25	0.39	0.14	0.087	0.045	0.013	0.069
Cornwall	-23	-25	30	23	4350	28	103	780	960	180	2.2	0.4	0.30	0.41	0.67	0.310	0.140	0.045	0.410
Corunna	-16	-18	31	23	3800	23	97	760	800	180	1.0	0.4	0.35	0.47	0.14	0.076	0.040	0.011	0.084
Deep River	-29	-32	30	22	5050	23	92	650	850	100	2.5	0.4	0.26	0.35	0.66	0.320	0.130	0.043	0.420
Deseronto	-22	-24	28	23	4200	23	97	760	900	160	1.9	0.4	0.32	0.43	0.27	0.150	0.076	0.021	0.140
Dorchester	-18	-20	30	23	4100	28	103	850	950	180	1.9	0.4	0.33	0.48	0.19	0.096	0.048	0.013	0.120
Dorion	-33	-35	28	21	5950	20	103	550	725	160	2.8	0.4	0.30	0.39	0.12	0.056	0.023	0.006	0.059
Dresden	-16	-18	31	24	3750	28	97	760	820	180	1	0.4	0.32	0.43	0.18	0.091	0.044	0.012	0.120
Dryden	-34	-36	27	22	6000	25	97	550	700	120	2.4	0.3	0.21	0.27	0.12	0.056	0.023	0.006	0.059
Dunnville	-15	-17	30	24	3900	23	119	830	950	160	2	0.4	0.33	0.42	0.35	0.170	0.062	0.019	0.260
Durham	-20	-22	29	22	4700	28	103	815	1025	140	2.8	0.4	0.31	0.44	0.14	0.080	0.042	0.012	0.068
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Table 1.2 (Cont'd)
Design Data for Selected Locations in Ontario

Location	Design Temperature				Degree Days Below 18°C	15 Min Rainfall, mm	One Day Rainfall, 1/50, mm	Annual Rainfall, mm	Annual Total Precipitation, mm	Driving Rain Wind Pressures, Pa, 1/5	Snow Load, kPa, 1/50		Hourly Wind Pressures, kPa		Seismic Data				
	January		July 2.5%																
	2.5%, °C	1%, °C	Dry °C	Wet °C							S_s	S_r	1/10	1/50	$S_a(0.2)$	$S_a(0.5)$	$S_a(1.0)$	$S_a(2.0)$	PGA
Dutton	-16	-18	31	24	3900	28	92	850	925	180	1.3	0.4	0.34	0.47	0.20	0.097	0.047	0.013	0.130
Earlton	-33	-36	30	21	5900	23	92	560	820	120	2.6	0.4	0.32	0.45	0.26	0.130	0.063	0.018	0.160
Edison	-34	-36	28	22	5950	25	108	510	680	120	2.4	0.3	0.23	0.31	0.12	0.056	0.023	0.006	0.059
Elmvale	-24	-26	29	22	4400	28	97	720	950	140	2.6	0.4	0.24	0.36	0.15	0.092	0.048	0.014	0.070
Embro	-18	-20	29	23	4200	28	119	830	950	160	2.0	0.4	0.33	0.48	0.18	0.094	0.048	0.013	0.120
Englehart	-33	-36	30	21	6000	23	92	600	880	100	2.5	0.4	0.29	0.41	0.25	0.120	0.061	0.018	0.160
Espanola	-25	-27	28	21	5200	23	108	650	840	160	2.3	0.4	0.28	0.42	0.12	0.075	0.038	0.011	0.059
Exeter	-17	-19	30	23	4150	25	113	810	975	180	2.4	0.4	0.37	0.53	0.14	0.079	0.043	0.011	0.076
Fenelon Falls	-25	-27	30	23	4650	25	108	730	950	120	2.3	0.4	0.25	0.36	0.18	0.110	0.056	0.016	0.081
Fergus	-20	-22	29	23	4600	33	108	760	925	160	2.2	0.4	0.26	0.36	0.18	0.094	0.047	0.013	0.100
Forest	-16	-18	31	23	3850	23	103	810	875	160	2.0	0.4	0.39	0.52	0.14	0.077	0.041	0.011	0.079
Fort Erie	-15	-17	30	24	3800	23	113	860	1020	160	2.6	0.4	0.36	0.46	0.40	0.190	0.070	0.021	0.290
Fort Erie (Ridgeway)	-15	-17	30	24	3750	28	113	860	1000	160	2.5	0.4	0.37	0.46	0.39	0.190	0.068	0.020	0.280
Fort Frances	-33	-35	29	22	5550	25	108	570	725	120	2.3	0.3	0.23	0.31	0.12	0.056	0.023	0.006	0.059
Gananoque	-22	-24	28	23	4200	23	103	760	900	180	2.1	0.4	0.35	0.47	0.31	0.170	0.088	0.025	0.170
Geraldton	-35	-38	28	21	6800	20	86	550	725	100	2.9	0.4	0.21	0.27	0.12	0.056	0.023	0.006	0.059
Glencoe	-16	-18	31	24	3900	28	103	800	925	180	1.5	0.4	0.31	0.43	0.19	0.093	0.046	0.012	0.120
Goderich	-16	-18	29	23	4000	23	92	810	950	180	2.4	0.4	0.40	0.55	0.12	0.073	0.039	0.011	0.062
Gore Bay	-23	-25	29	21	4900	23	92	640	860	160	2.6	0.4	0.30	0.39	0.12	0.067	0.034	0.010	0.059
Graham	-37	-40	29	22	6400	23	97	570	750	140	2.6	0.3	0.21	0.27	0.12	0.056	0.023	0.006	0.059
Gravenhurst (Muskoka Airport)	-26	-28	29	22	4750	25	103	790	1050	120	2.7	0.4	0.26	0.35	0.17	0.100	0.052	0.015	0.073
Grimsby	-16	-18	30	23	3650	23	108	760	875	160	0.9	0.4	0.36	0.46	0.40	0.190	0.069	0.020	0.290
Guelph	-19	-21	29	23	4350	28	113	770	875	140	1.9	0.4	0.25	0.33	0.21	0.100	0.049	0.013	0.130
Guthrie	-24	-26	29	22	4550	28	103	700	950	120	2.5	0.4	0.21	0.33	0.16	0.096	0.049	0.014	0.075
Haileybury	-32	-35	30	21	5600	23	92	590	820	120	2.4	0.4	0.32	0.44	0.29	0.140	0.069	0.020	0.180
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Table 1.2 (Cont'd)
Design Data for Selected Locations in Ontario

Location	Design Temperature				Degree Days Below 18°C	15 Min Rainfall, mm	One Day Rainfall, 1/50, mm	Annual Rainfall, mm	Annual Total Precipitation, mm	Driving Rain Wind Pressures, Pa, 1/5	Snow Load, kPa, 1/50		Hourly Wind Pressures, kPa		Seismic Data				
	January		July 2.5%																
	2.5%, °C	1%, °C	Dry, °C	Wet, °C							S_s	S_r	1/10	1/50	$S_a(0.2)$	$S_a(0.5)$	$S_a(1.0)$	$S_a(2.0)$	PGA
Haldimand (Caledonia)	17	19	30	23	3900	23	108	810	875	160	1.2	0.4	0.31	0.40	0.34	0.170	0.060	0.019	0.250
Haldimand (Hagersville)	-16	-18	30	23	4000	25	97	840	875	160	1.3	0.4	0.33	0.42	0.29	0.140	0.053	0.017	0.220
Haliburton	-27	-29	29	22	4950	25	92	780	980	100	2.9	0.4	0.26	0.35	0.21	0.120	0.062	0.019	0.100
Halton Hills (Georgetown)	-19	-21	30	23	4300	28	119	750	850	140	1.4	0.4	0.27	0.37	0.25	0.120	0.051	0.015	0.170
Hamilton	-17	-19	31	23	3600	23	108	810	875	160	0.9	0.4	0.36	0.46	0.33	0.160	0.058	0.018	0.240
Hanover	-19	-21	30	22	4600	28	108	790	1050	140	2.6	0.4	0.34	0.48	0.13	0.077	0.041	0.011	0.065
Hastings	-23	26	30	23	4450	28	92	730	840	140	2.0	0.4	0.29	0.41	0.23	0.130	0.065	0.018	0.110
Hawkesbury	25	27	30	23	4750	23	103	800	925	160	2.3	0.4	0.31	0.41	0.65	0.320	0.140	0.042	0.390
Hearst	34	36	28	21	6500	20	81	520	825	80	2.8	0.3	0.20	0.28	0.12	0.056	0.027	0.008	0.059
Honey Harbour	24	-26	29	22	4300	23	97	710	1050	160	2.7	0.4	0.25	0.39	0.15	0.095	0.048	0.014	0.068
Hornepayne	-37	-40	28	21	6500	20	97	420	750	80	3.6	0.4	0.19	0.28	0.12	0.056	0.023	0.007	0.059
Huntsville	-26	-29	29	22	4900	25	103	800	1000	120	2.9	0.4	0.26	0.35	0.20	0.120	0.056	0.017	0.094
Ingersoll	-18	-20	30	23	4100	28	108	840	950	180	1.7	0.4	0.33	0.48	0.19	0.098	0.049	0.013	0.120
Iroquois Falls	-33	-36	29	21	6300	20	86	575	825	100	2.9	0.3	0.30	0.40	0.21	0.100	0.049	0.015	0.150
Jellicoe	-36	-39	28	21	6600	20	86	550	750	100	2.7	0.4	0.21	0.27	0.12	0.056	0.023	0.006	0.059
Kapuskasing	-33	-35	28	21	6450	20	86	550	825	100	2.8	0.3	0.23	0.31	0.14	0.073	0.036	0.011	0.091
Kemptville	-25	-27	30	23	4650	25	86	750	925	160	2.3	0.4	0.30	0.41	0.60	0.280	0.120	0.040	0.370
Kenora	33	36	28	22	5850	25	113	515	630	120	2.3	0.3	0.23	0.31	0.12	0.056	0.023	0.006	0.059
Killaloe	-28	-31	30	22	5100	23	86	680	825	120	2.7	0.4	0.26	0.35	0.48	0.230	0.100	0.034	0.310
Kincardine	-17	-19	28	22	4100	23	92	800	950	180	2.6	0.4	0.40	0.55	0.12	0.073	0.038	0.011	0.060
Kingston	-22	-24	27	23	4300	23	113	780	950	180	2.1	0.4	0.35	0.47	0.30	0.160	0.084	0.024	0.160
Kinmount	-26	-28	29	22	4800	25	108	750	950	120	2.7	0.4	0.26	0.35	0.19	0.120	0.058	0.017	0.087
Kirkland Lake	-33	-36	30	21	6100	20	103	600	875	100	2.9	0.3	0.29	0.41	0.24	0.120	0.057	0.017	0.150
Kitchener	-19	-21	29	23	4250	28	119	780	925	140	2.0	0.4	0.27	0.37	0.19	0.096	0.048	0.013	0.110
Lakefield	-24	-26	30	23	4550	28	92	720	850	140	2.2	0.4	0.27	0.38	0.20	0.120	0.061	0.017	0.095
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Table 1.2 (Cont'd)
Design Data for Selected Locations in Ontario

Location	Design Temperature				Degree Days Below 18°C	15 Min Rainfall, mm	One Day Rainfall, 1/50, mm	Annual Rainfall, mm	Annual Total Precipitation, mm	Driving Rain Wind Pressures, Pa, 1/5	Snow Load, kPa, 1/50		Hourly Wind Pressures, kPa		Seismic Data				
	January		July 2.5%										1/10	1/50	$S_a(0.2)$	$S_a(0.5)$	$S_a(1.0)$	$S_a(2.0)$	PGA
	2.5%, °C	1%, °C	Dry, °C	Wet, °C							S_s	S_r							
Lansdowne House	-39	-41	28	21	7150	18	97	500	680	140	2.9	0.2	0.24	0.32	0.12	0.056	0.023	0.010	0.059
Leamington	-15	-17	31	24	3600	28	113	800	875	180	0.8	0.4	0.35	0.47	0.20	0.096	0.043	0.012	0.140
Lindsay	24	-26	30	23	4550	25	103	720	850	140	2.3	0.4	0.26	0.38	0.18	0.110	0.057	0.016	0.084
Lion's Head	-19	-21	27	22	4300	25	108	700	950	180	2.7	0.4	0.33	0.48	0.12	0.077	0.040	0.012	0.059
Listowel	-19	-21	29	23	4500	30	119	800	1000	160	2.6	0.4	0.34	0.47	0.15	0.081	0.043	0.012	0.075
London	-18	-20	30	23	4150	28	103	825	975	180	1.9	0.4	0.36	0.54	0.18	0.094	0.047	0.013	0.120
Lucan	-17	-19	30	23	4150	25	113	810	1000	180	2.3	0.4	0.39	0.55	0.16	0.083	0.044	0.012	0.093
Maitland	-23	-25	29	23	4200	25	103	770	975	180	2.2	0.4	0.32	0.44	0.41	0.210	0.110	0.031	0.230
Markdale	-20	-22	29	22	4600	28	103	820	1050	160	3.4	0.4	0.29	0.41	0.14	0.081	0.043	0.012	0.067
Markham	-20	-22	31	24	4200	25	86	720	825	140	1.3	0.4	0.39	0.53	0.22	0.110	0.055	0.015	0.120
Martin	-36	-39	29	22	6200	25	103	560	750	120	2.6	0.3	0.21	0.27	0.12	0.056	0.023	0.006	0.059
Matheson	33	-36	29	21	6250	20	86	580	825	100	2.8	0.3	0.30	0.41	0.22	0.110	0.052	0.015	0.150
Mattawa	-29	-31	30	22	5300	23	86	700	875	100	2.1	0.4	0.24	0.32	0.51	0.240	0.099	0.033	0.340
Midland	-23	-26	29	22	4300	25	97	740	1060	160	2.7	0.4	0.25	0.39	0.15	0.093	0.048	0.014	0.068
Milton	-18	-20	30	23	4100	25	119	750	850	160	1.3	0.4	0.32	0.43	0.30	0.150	0.054	0.017	0.220
Milverton	-19	-21	29	23	4450	30	108	800	1050	160	2.4	0.4	0.31	0.43	0.15	0.082	0.045	0.012	0.080
Minden	-26	-29	29	22	4900	25	97	780	1010	100	2.7	0.4	0.26	0.35	0.19	0.120	0.058	0.017	0.089
Mississauga	18	-20	30	23	3950	25	113	720	800	160	1.1	0.4	0.37	0.49	0.31	0.150	0.055	0.017	0.220
Mississauga (Port Credit)	18	-20	30	23	3800	25	108	720	800	160	0.9	0.4	0.37	0.49	0.32	0.160	0.058	0.018	0.240
Mitchell	-18	-20	29	23	4400	28	113	810	1050	160	2.4	0.4	0.35	0.50	0.14	0.080	0.043	0.012	0.075
Moosonee	-36	-38	28	21	7100	18	81	500	700	160	2.2	0.3	0.26	0.35	0.15	0.073	0.035	0.010	0.100
Morrisburg	-23	-25	30	23	4550	25	108	800	950	180	2.3	0.4	0.30	0.41	0.63	0.290	0.130	0.042	0.390
Mount Forest	-21	-23	29	22	4750	30	103	740	940	140	2.7	0.4	0.29	0.41	0.15	0.082	0.043	0.012	0.074
Nakina	-35	-37	28	21	6900	20	86	540	750	100	2.8	0.4	0.21	0.27	0.12	0.056	0.023	0.006	0.059
Nanticoke (Jarvis)	-16	-18	30	23	4000	28	108	840	900	160	1.4	0.4	0.33	0.43	0.26	0.13	0.053	0.015	0.18
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Table 1.2 (Cont'd)
Design Data for Selected Locations in Ontario

Location	Design Temperature				Degree Days Below 18°C	15 Min Rainfall, mm	One Day Rainfall 1/50 mm	Annual Rainfall mm	Annual Total Precipitation, mm	Driving Rain Wind Pressures Pa 1/5	Snow Load, kPa, 1/50		Hourly Wind Pressures, kPa		Seismic Data				
	January		July 2.5%																
	2.5% °C	1% °C	Dry °C	Wet °C							S_s	S_r	1/10	1/50	$S_a(0.2)$	$S_a(0.5)$	$S_a(1.0)$	$S_a(2.0)$	PGA
Nanticoke (Port Dover)	-15	-17	30	24	3900	25	108	860	950	140	1.2	0.4	0.36	0.46	0.23	0.110	0.052	0.014	0.150
Napanee	-22	-24	28	23	4250	23	92	770	900	160	1.9	0.4	0.32	0.43	0.28	0.150	0.078	0.022	0.150
New Liskeard	-32	-35	30	21	5700	23	92	570	810	100	2.3	0.4	0.31	0.43	0.29	0.140	0.068	0.020	0.180
Newcastle	-20	-22	30	23	4200	23	86	760	830	160	1.5	0.4	0.46	0.59	0.22	0.120	0.061	0.016	0.120
Newcastle (Bowmanville)	-20	-22	30	23	4200	23	86	760	830	160	1.4	0.4	0.46	0.60	0.21	0.120	0.060	0.016	0.120
Newmarket	-22	-24	30	23	4400	28	108	700	800	140	2.0	0.4	0.26	0.38	0.19	0.100	0.051	0.014	0.100
Niagara Falls	-16	-18	30	23	3700	23	103	810	950	160	2.0	0.4	0.33	0.43	0.41	0.200	0.073	0.021	0.300
North Bay	-28	-30	28	21	5300	28	97	775	975	120	2.2	0.4	0.26	0.34	0.29	0.150	0.068	0.022	0.180
Norwood	-24	-26	30	23	4500	28	92	720	850	120	2.1	0.4	0.29	0.41	0.22	0.120	0.065	0.018	0.110
Oakville	-18	-20	30	23	3800	23	97	750	850	160	0.9	0.4	0.37	0.49	0.35	0.170	0.062	0.020	0.260
Orangeville	-21	-23	29	23	4600	30	108	730	875	140	2.3	0.4	0.25	0.36	0.18	0.095	0.048	0.013	0.099
Orillia	-25	-27	29	22	4600	25	103	740	1000	120	2.4	0.4	0.26	0.35	0.16	0.099	0.050	0.015	0.073
Oshawa	-19	-21	30	23	4000	23	86	760	875	160	1.4	0.4	0.43	0.57	0.21	0.110	0.059	0.016	0.120
Ottawa	-25	-27	30	23	4600	23	86	750	900	160	2.4	0.4	0.30	0.41	0.66	0.320	0.130	0.044	0.420
Owen Sound	-19	-21	29	22	4250	28	119	760	1075	160	2.8	0.4	0.33	0.48	0.13	0.079	0.041	0.012	0.061
Pagwa River	-34	-36	28	21	6600	20	97	540	825	80	2.4	0.4	0.19	0.28	0.12	0.056	0.023	0.006	0.059
Paris	-17	-19	30	23	4100	23	92	790	925	160	1.4	0.4	0.31	0.41	0.22	0.110	0.050	0.013	0.140
Parkhill	-16	-18	31	23	4000	23	103	800	925	180	2.1	0.4	0.40	0.55	0.15	0.080	0.043	0.011	0.085
Parry Sound	-24	-26	28	21	4700	23	103	820	1050	160	2.8	0.4	0.24	0.39	0.16	0.098	0.049	0.015	0.072
Pelham (Fonthill)	-15	-17	30	23	3800	23	103	820	950	160	2.3	0.4	0.33	0.42	0.40	0.200	0.071	0.021	0.300
Pembroke	-28	-31	30	22	5000	23	108	640	825	100	2.5	0.4	0.26	0.35	0.66	0.320	0.130	0.044	0.420
Penetanguishene	-23	-26	29	22	4300	25	97	720	1050	160	2.8	0.4	0.25	0.39	0.15	0.093	0.047	0.014	0.067
Perth	-25	-27	30	23	4650	25	92	730	900	140	2.3	0.4	0.29	0.41	0.39	0.200	0.098	0.030	0.230
Petawawa	-29	-31	30	22	5150	23	92	640	825	100	2.6	0.4	0.26	0.35	0.66	0.320	0.130	0.043	0.420
Peterborough	-23	-25	30	23	4400	28	92	710	840	140	2.0	0.4	0.29	0.41	0.20	0.120	0.061	0.017	0.099
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Table 1.2 (Cont'd)
Design Data for Selected Locations in Ontario

Location	Design Temperature				Degree Days Below 18°C	15 Min Rainfall, mm	One Day Rainfall, 1/50, mm	Annual Rainfall, mm	Annual Total Precipitation, mm	Driving Rain Wind Pressures, Pa, 1/5	Snow Load, kPa, 1/50		Hourly Wind Pressures, kPa		Seismic Data				
	January		July 2.5%										1/10	1/50	$S_a(0.2)$	$S_a(0.5)$	$S_a(1.0)$	$S_a(2.0)$	PGA
	2.5%, °C	1%, °C	Dry °C	Wet °C							S_s	S_r							
Petrolia	-16	-18	31	24	3850	25	108	810	920	180	1.3	0.4	0.35	0.47	0.16	0.081	0.042	0.011	0.094
Pickering (Dumbarton)	-19	-21	30	23	4000	23	92	730	825	140	1.0	0.4	0.43	0.57	0.23	0.110	0.057	0.015	0.130
Picton	-21	-23	29	23	4050	23	92	770	940	160	2	0.4	0.37	0.49	0.26	0.140	0.073	0.020	0.140
Plattsville	-18	-20	29	23	4200	28	103	820	950	140	1.9	0.4	0.30	0.41	0.18	0.094	0.049	0.013	0.110
Point Alexander	-29	-32	30	22	5050	23	92	650	850	100	2.5	0.4	0.26	0.35	0.66	0.320	0.130	0.043	0.420
Port Burwell	-15	-17	30	24	4000	25	92	930	1000	180	1.2	0.4	0.34	0.47	0.21	0.100	0.050	0.013	0.140
Port Colborne	-15	-17	30	24	3750	23	113	850	1000	160	2.3	0.4	0.37	0.46	0.38	0.190	0.068	0.020	0.280
Port Elgin	-17	-19	28	22	4250	23	92	790	850	180	2.8	0.4	0.40	0.55	0.12	0.074	0.039	0.011	0.059
Port Hope	-21	-23	30	23	4050	23	97	760	825	180	1.2	0.4	0.46	0.59	0.23	0.120	0.064	0.017	0.130
Port Perry	-22	-24	30	23	4350	25	97	720	850	140	2.4	0.4	0.31	0.44	0.19	0.110	0.056	0.015	0.096
Port Stanley	-15	-17	31	24	4000	25	92	940	975	180	1.2	0.4	0.34	0.47	0.20	0.100	0.048	0.013	0.140
Prescott	-23	-25	29	23	4250	25	103	770	975	180	2.2	0.4	0.32	0.44	0.44	0.230	0.120	0.033	0.270
Princeton	-17	-19	29	23	4100	25	97	810	925	160	1.5	0.4	0.30	0.41	0.20	0.099	0.050	0.013	0.120
Raith	-35	-37	28	22	6150	20	97	570	750	120	2.7	0.4	0.21	0.27	0.12	0.056	0.023	0.006	0.059
Rayside-Balfour (Chelmsford)	-28	-30	29	21	5400	25	92	650	850	180	2.5	0.4	0.29	0.45	0.14	0.087	0.043	0.013	0.070
Red Lake	-34	-36	28	22	6350	18	86	470	630	120	2.4	0.3	0.22	0.28	0.12	0.056	0.023	0.010	0.059
Renfrew	-27	-30	30	23	4900	23	103	620	810	140	2.5	0.4	0.26	0.35	0.63	0.300	0.120	0.041	0.390
Richmond Hill	-20	-22	31	24	4200	25	97	740	850	140	1.5	0.4	0.39	0.53	0.22	0.110	0.053	0.014	0.130
Rockland	-26	-28	30	23	4800	23	92	780	950	160	2.4	0.4	0.30	0.40	0.66	0.310	0.140	0.044	0.410
Sarnia	-16	-18	31	23	3950	23	103	750	825	180	1.1	0.4	0.35	0.47	0.14	0.075	0.040	0.010	0.078
Sault Ste. Marie	-25	-28	29	21	5100	25	103	660	950	200	3.1	0.4	0.32	0.40	0.12	0.056	0.026	0.010	0.059
Schreiber	-35	-38	27	21	6200	20	108	600	850	160	3.3	0.4	0.30	0.39	0.12	0.056	0.023	0.010	0.059
Seaforth	-17	-19	30	23	4300	25	108	810	1025	160	2.5	0.4	0.37	0.53	0.14	0.077	0.042	0.011	0.067
Simcoe	-17	-19	30	23	4000	28	119	860	950	160	1.3	0.4	0.33	0.43	0.22	0.110	0.052	0.014	0.140
Sioux Lookout	-34	-36	28	22	6200	28	97	520	710	100	2.4	0.3	0.21	0.27	0.12	0.056	0.023	0.010	0.059
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Table 1.2 (Cont'd)
Design Data for Selected Locations in Ontario

Location	Design Temperature				Degree Days Below 18°C	15 Min Rainfall mm	One Day Rainfall 1/50 mm	Annual Rainfall, mm	Annual Total Precipitation, mm	Driving Rain Wind Pressures Pa, 1/5	Snow Load, kPa, 1/50		Hourly Wind Pressures, kPa		Seismic Data				
	January		July 2.5%																
	2.5% °C	1% °C	Dry °C	Wet °C							S_s	S_r	1/10	1/50	$S_a(0.2)$	$S_a(0.5)$	$S_a(1.0)$	$S_a(2.0)$	PGA
Smiths Falls	-25	-27	30	23	4600	28	92	730	850	140	2.3	0.4	0.29	0.41	0.42	0.220	0.100	0.032	0.260
Smithville	-16	-18	30	23	3800	23	119	800	900	160	1.5	0.4	0.33	0.42	0.40	0.190	0.069	0.020	0.290
Smooth Rock Falls	-34	-36	29	21	6400	20	92	560	850	80	2.7	0.3	0.24	0.32	0.19	0.092	0.042	0.013	0.140
South River	-27	-29	28	21	5200	28	97	830	975	120	2.8	0.4	0.23	0.32	0.23	0.130	0.060	0.019	0.130
Southampton	-17	-19	28	22	4250	23	92	800	830	180	2.7	0.4	0.38	0.53	0.12	0.074	0.039	0.011	0.059
St. Catharines	-16	-18	30	23	3675	23	92	770	850	160	1.0	0.4	0.36	0.46	0.41	0.200	0.072	0.021	0.300
St. Mary's	-18	-20	30	23	4250	28	108	820	1025	160	2.2	0.4	0.35	0.51	0.16	0.086	0.045	0.012	0.096
St. Thomas	-16	-18	31	23	[illegible]	25	108	900	975	180	1.4	0.4	0.33	0.48	0.20	0.098	0.048	0.013	0.130
Stirling	-23	-25	30	23	[illegible]	25	97	740	850	120	1.7	0.4	0.28	0.40	0.25	0.140	0.071	0.020	0.130
Stratford	-18	-20	29	23	4350	28	124	820	1050	160	2.3	0.4	0.33	0.48	0.16	0.085	0.046	0.012	0.091
Strathroy	-17	-19	31	23	3950	25	103	770	950	180	1.9	0.4	0.36	0.50	0.17	0.087	0.045	0.012	0.110
Sturgeon Falls	-27	-29	29	21	5250	28	97	700	910	140	2.2	0.4	0.25	0.35	0.23	0.120	0.059	0.018	0.140
Sudbury	-28	-30	29	21	5400	25	97	650	875	200	2.5	0.4	0.29	0.46	0.15	0.091	0.045	0.014	0.078
Sundridge	-27	-29	28	21	5200	28	97	840	975	120	2.8	0.4	0.23	0.32	0.22	0.120	0.059	0.019	0.120
Tavistock	-18	-20	29	23	4350	28	124	820	1010	160	2.1	0.4	0.34	0.47	0.17	0.089	0.047	0.013	0.100
Temagami	-30	-33	30	21	5400	25	92	650	875	120	2.6	0.4	0.27	0.37	0.30	0.140	0.068	0.021	0.190
Thamesford	-18	-20	30	23	4200	28	108	820	975	160	1.9	0.4	0.33	0.48	0.18	0.095	0.048	0.013	0.120
Thedford	-16	-18	31	23	3900	23	103	810	900	180	2.1	0.4	0.41	0.55	0.14	0.078	0.042	0.011	0.080
Thunder Bay	-31	-33	28	21	5650	20	108	560	710	160	2.9	0.4	0.30	0.39	0.12	0.056	0.023	0.006	0.059
Tillsonburg	-17	-19	30	23	4000	25	103	880	980	160	1.3	0.4	0.31	0.44	0.20	0.100	0.050	0.013	0.140
Timmins	-34	-36	30	21	6200	18	103	560	875	100	3.1	0.3	0.25	0.35	0.17	0.089	0.045	0.013	0.110
Timmins (Porcupine)	-34	-36	30	21	6200	18	97	560	875	100	2.9	0.3	0.27	0.37	0.19	0.093	0.047	0.013	0.120
Toronto (Metropolitan)																			
Etobicoke	-20	-22	31	24	4050	26	103	720	800	160	1.1	0.4	0.39	0.53	0.26	0.130	0.054	0.015	0.180
North York	-20	-22	31	24	4000	25	103	730	850	150	1.2	0.4	0.39	0.53	0.24	0.120	0.054	0.015	0.150
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Table 1.2 (Cont'd)
Design Data for Selected Locations in Ontario

Location	Design Temperature				Degree Days Below 18°C	15 Min Rainfall, mm	One Day Rainfall, 1/50, mm	Annual Rainfall, mm	Annual Total Precipitation, mm	Driving Rain Wind Pressures, Pa, 1/5	Snow Load, kPa, 1/50		Hourly Wind Pressures, kPa		Seismic Data				
	January		July 2.5%																
	2.5% °C	1% °C	Dry °C	Wet °C							S_s	S_r	1/10	1/50	$S_a(0.2)$	$S_a(0.5)$	$S_a(1.0)$	$S_a(2.0)$	PGA
Scarborough	-20	-22	31	24	4000	25	92	730	825	160	1.2	0.4	0.39	0.53	0.24	0.120	0.056	0.015	0.150
Toronto	-18	-20	31	23	3650	25	97	720	820	160	0.9	0.4	0.39	0.52	0.26	0.130	0.055	0.015	0.170
Trenton	-21	-23	29	23	4250	23	103	760	850	160	1.6	0.4	0.35	0.47	0.25	0.130	0.070	0.019	0.140
Trout Creek	-27	-29	28	21	5300	28	103	780	975	120	2.7	0.4	0.24	0.32	0.25	0.140	0.064	0.020	0.150
Uxbridge	-22	-24	30	23	4400	25	103	700	850	140	2.4	0.4	0.29	0.42	0.19	0.100	0.054	0.015	0.094
Vaughan (Woodbridge)	-20	-22	31	24	4250	26	113	700	800	140	1.1	0.4	0.39	0.53	0.24	0.120	0.053	0.014	0.150
Vittoria	-15	-17	30	24	3925	25	124	880	950	160	1.3	0.4	0.35	0.47	0.21	0.100	0.052	0.014	0.140
Walkerton	-18	-20	30	22	4500	28	113	790	1025	160	2.7	0.4	0.35	0.50	0.13	0.076	0.041	0.011	0.064
Wallaceburg	-16	-18	31	24	3700	28	97	760	825	180	0.9	0.4	0.32	0.43	0.18	0.087	0.041	0.011	0.110
Waterloo	-19	-21	29	23	4300	28	119	780	925	160	2.0	0.4	0.27	0.37	0.19	0.095	0.048	0.013	0.100
Watford	-16	-18	31	24	3900	25	108	790	950	160	1.9	0.4	0.34	0.47	0.16	0.082	0.043	0.011	0.097
Wawa	-35	-38	26	21	5800	20	103	725	950	160	4.1	0.4	0.30	0.39	0.12	0.056	0.023	0.008	0.059
Welland	-15	-17	30	23	3800	23	103	840	975	160	2.2	0.4	0.33	0.43	0.40	0.200	0.070	0.021	0.290
West Lorne	-16	-18	31	24	3850	28	103	840	900	180	1.3	0.4	0.34	0.47	0.20	0.097	0.047	0.013	0.130
Whitby	-20	-22	30	23	4000	23	86	760	850	160	1.2	0.4	0.43	0.57	0.21	0.110	0.058	0.015	0.120
Whitby (Brooklin)	-20	-22	30	23	4200	23	86	770	850	140	1.9	0.4	0.38	0.53	0.20	0.110	0.057	0.015	0.110
White River	-39	-42	28	21	6400	20	92	575	825	100	4.5	0.4	0.21	0.27	0.12	0.056	0.023	0.007	0.059
Wiarton	-18	-20	28	22	4500	25	113	740	1000	180	2.7	0.4	0.33	0.48	0.12	0.077	0.040	0.012	0.059
Windsor	-16	-18	31	24	3600	28	103	800	900	180	0.8	0.4	0.36	0.47	0.18	0.086	0.040	0.011	0.120
Wingham	-18	-20	30	23	4350	28	108	780	1050	160	2.6	0.4	0.35	0.50	0.13	0.075	0.041	0.011	0.065
Woodstock	-18	-20	29	23	4100	28	113	830	930	160	1.9	0.4	0.31	0.44	0.19	0.097	0.049	0.013	0.120
Wyoming	-16	-18	31	24	3850	25	103	815	900	180	1.6	0.4	0.35	0.47	0.15	0.079	0.042	0.011	0.088
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Ministry of Municipal Affairs and Housing
Building and Development Branch

Ontario

2006 Building Code | Supplementary Standards

Supplementary Standard SB-2

Fire Performance Ratings

August 15, 2006

Supplementary
Standard
SB-2

COMMENCEMENT

Supplementary Standard SB-2 comes into force on the 31st day of December, 2006.

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SB-2 Fire-Performance Ratings

(This Standard is based in large measure on Appendix D of the National Building Code of Canada 2005)

Section 1 General

The contents of this Supplementary Standard have been prepared on the recommendations of the Standing Committee on Fire Performance Ratings, which was established by the Canadian Commission on Building and Fire Codes (CCBFC) for this purpose.

1.1. Introduction

1.1.1. Scope

(1) This fire-performance information is presented in a form closely linked to the performance requirements and the minimum materials specifications of the 2006 Building Code.

(2) The ratings have been assigned only after careful consideration of all available literature on assemblies of common building materials, where they are adequately identified by description. The assigned values based on this information will, in most instances, be conservative when compared to the ratings determined on the basis of actual tests on individual assemblies.

(3) The fire-performance information set out in this Supplementary Standard applies to materials and assemblies of materials which comply in all essential details with the minimum structural design standards described in Part 4 of Division B in the 2006 Building Code. Additional requirements, where appropriate, are described in other Sections of this Supplementary Standard.

(4) Section 2 of this Supplementary Standard assigns fire-resistance ratings for walls, floors, roofs, columns and beams related to CAN/ULC-S101, "Fire Endurance Tests of Building Construction and Materials", and describes methods for determining these ratings.

(5) Section 3 assigns flame-spread ratings and smoke developed classifications for surface materials related to CAN/ULC-S102, "Test for Surface Burning Characteristics of Building Materials and Assemblies" and CAN/ULC-S102.2, "Test for Surface Burning Characteristics of Flooring, Floor Covering, and Miscellaneous Materials and Assemblies".

(6) Section 4 describes noncombustibility in building materials when tested in accordance with CAN4-S114-M, "Test for Determination of Non-Combustibility in Building Materials".

(7) Section 5 contains requirements for the installation of fire doors and fire dampers in fire-rated stud wall assemblies and the installation of fire stop flaps in fire-rated membrane ceilings.

(8) Section 6 contains background information regarding fire test reports, obsolete materials and assemblies, assessment of archaic assemblies and the development of the component additive method.

1.1.2. Referenced Documents

(1) Where documents are referenced in this Supplementary Standard, they shall be the editions designated in Table 1.1.2.

Table 1.1.2.
Documents Referenced in SB-2 Fire-Performance Ratings

Issuing Agency	Document Number	Title of Document	Reference
ANSI	A208.1-1999	Particleboard, Mat-Formed Wood	Table 3.1.1.A.
ASTM	C36 / C36M-03	Gypsum Wallboard	1.5.1. Table 3.1.1.A.
ASTM	C37 / C37M-01	Gypsum Lath	1.5.1.
ASTM	C330-04	Lightweight Aggregates for Structural Concrete	1.4.3.(2)
ASTM	C442 / C442M-04	Gypsum Backing Board, Gypsum Coreboard, and Gypsum Shaftliner Board	1.5.1. Table 3.1.1.A.
ASTM	C588 / C588M-03	Gypsum Base for Veneer Plasters	1.5.1. Table 3.1.1.A.
ASTM	C630 / C630M-03	Water-Resistant Gypsum Backing Board	1.5.1. Table 3.1.1.A.
ASTM	C931 / C931M-04	Exterior Gypsum Soffit Board	1.5.1. Table 3.1.1.A.
ASTM	C960 / C960M-04	Predecorated Gypsum Board	1.5.1.
CCBFC	NRCC 30629	Supplement to the National Building Code of Canada 1990	6.2. 6.3. 6.4.
CGSB	4-GP-36M-1978	Carpet Underlay, Fibre Type	Table 3.1.1.B.
CGSB	CAN/CGSB-4.129-97	Carpets for Commercial Use	Table 3.1.1.B.
CGSB	CAN/CGSB-11.3-M87	Hardboard	Table 3.1.1.A.
CGSB	CAN/CGSB-34.16-M89	Sheets, Asbestos-Cement, Flat, Fully Compressed	Table 3.1.1.A.
CGSB	CGSB-92.2-M90	Trowel or Spray Applied Acoustical Material	2.3.4.(5)
CSA	CAN/CSA-A23.1-04 / A23.2-04	Concrete Materials and Methods of Concrete Construction / Methods of Test and Standard Practices for Concrete	1.4.3.(1)
CSA	A23.3-04	Design of Concrete Structures	2.1.5. 2.6.6. Table 2.6.6.B. 2.8.2. Table 2.8.2.
CSA	A82.5-M1978	Structural Clay Non-Load-Bearing Tile	Table 2.6.1.A.
CSA	A82.22-M1977	Gypsum Plasters	Table 3.1.1.A.
CSA	CAN/CSA-A82.27-M91	Gypsum Board	1.5.1. Table 3.1.1.A.
CSA	A82.30-M1980	Interior Furring, Lathing and Gypsum Plastering	1.7.2.(1) 2.3.9.(1) Table 2.5.1.
CSA	A82.31-M1980	Gypsum Board Application	2.3.9.(1) 2.3.9.(6)
CSA	A126.1-M1984	Vinyl Asbestos and Vinyl Composition Floor Tile	Table 3.1.1.B.
CSA	A165.1-04	Concrete Block Masonry Units	Table 2.1.1.
Column 1	2	3	4

Table 1.1.2. (Cont'd)
Documents Referenced in SB-2 Fire-Performance Ratings

Issuing Agency	Document Number	Title of Document	Code Reference
CSA	CAN/CSA-O86-01 (Including Supplement CAN/CSA-O86S1-05)	Engineering Design in Wood	2.11.2.(1) 2.11.2.(2)
CSA	O121-M1978	Douglas Fir Plywood	Table 3.1.1.A.
CSA	O141-05	Softwood Lumber	2.3.6.(2) Table 2.4.1.
CSA	O151-04	Canadian Softwood Plywood	Table 3.1.1.A.
CSA	O153-M1980	Poplar Plywood	Table 3.1.1.A.
CSA	O437.0-93	OSB and Waferboard	Table 3.1.1.A.
CSA	CAN/CSA-S16-01 (Including Supplement CAN/CSA-S16S1-05)	Limit States Design of Steel Structures	2.6.6. Table 2.6.6.B.
NFPA	80-1999	Fire Doors and Windows	5.2.1.(1) 5.2.1.(2)
ULC	CAN/ULC-S101-04	Fire Endurance Tests of Building Construction and Materials	1.1.1.(4) 1.1.2.1. 2.3.2.
ULC	CAN/ULC-S102-03	Test for Surface Burning Characteristics of Building Materials and Assemblies	1.1.1.(5)
ULC	CAN/ULC-S102.2-03	Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies	1.1.1.(5) Table 3.1.1.B.
ULC	CAN4-S114-M80	Test for Determination of Non-Combustibility in Building Materials	1.1.1.(6) 4.1.1. 4.2.1.
ULC	S505-1974	Fusible Links for Fire Protection Service	5.3.2.
ULC	CAN/ULC-S702-97	Mineral Fibre Thermal Insulation for Buildings	Table 2.3.4.A.; Table 2.3.4.D.; 2.3.5.(2) 2.3.5.(4) Table 2.6.1.E. 6.4.
ULC	CAN/ULC-S703-01	Cellulose Fibre Insulation (CFI) for Buildings	2.3.4.(5)
ULC	CAN/ULC-S706-02	Wood Fibre Thermal Insulation for Buildings	Table 3.1.1.A.
Column 1	2	3	4

1.1.3. Applicability of Ratings

(1) The ratings shown in this document apply if more specific test values are not available. The construction of an assembly that is the subject of an individual test report must be followed in all essential details if the fire-resistance rating reported is to be applied for use with the Building Code.

1.1.4. Higher Ratings

(1) The authority having jurisdiction may allow higher fire-resistance ratings than those derived from this Supplementary Standard, where supporting evidence justifies a higher rating. Additional information is provided in summaries of published test information and the reports of fire tests carried out by the Institute for Research in Construction, National Research Council of Canada, included in Section 6, Background Information.

1.1.5. Additional Information on Fire Rated Assemblies

(1) Assemblies containing materials for which there is no nationally recognized standard are not included in this Supplementary Standard. Many such assemblies have been rated by Underwriters' Laboratories of Canada (ULC) or Warnock Hersey. The ULC information is published in their "List of Equipment and Materials," Volume II, Building Construction. Copies of this document may be obtained from Underwriters' Laboratories of Canada, 7 Crouse Road, Scarborough, Ontario M1R 3A9. The Warnock Hersey Certification Listings can be obtained from Warnock Hersey, 3210 American Drive, Mississauga, Ontario L4V 1B3.

1.2. Interpretation of Test Results

1.2.1. Limitations

(1) The fire-performance ratings set out in this Supplementary Standard are based on those that would be obtained from the standard methods of test described in the Building Code. The test methods are essentially a means of comparing the performance of one building component or assembly with another in relation to its performance in fire.

(2) Since it is not practicable to measure the fire resistance of constructions in situ, they must be evaluated under some agreed test conditions. A specified fire-resistance rating is not necessarily the actual time that the assembly would endure in situ in a building fire, but is that which the particular construction must meet under the specified methods of test.

(3) Considerations arising from departures in use from the conditions established in the standard test methods may, in some circumstances, have to be taken into account by the designer and the authority having jurisdiction. Some of these conditions are covered at present by the provisions of the Code.

(4) For walls and partitions, the stud spacings previously specified as 16 or 24 inch have been converted to 400 and 600 mm, respectively, for consistency with other metric values; however, the use of equivalent imperial dimensions for stud spacing is permitted.

1.3. Concrete

1.3.1. Aggregates in Concrete

(1) Low density aggregate concretes generally exhibit better fire performance than natural stone aggregate concretes. A series of tests on concrete masonry walls, combined with mathematical analysis of the test results, has allowed further distinctions between certain low density aggregates to be made.

1.4. Types of Concrete

1.4.1. Description

(1) For purposes of this Supplementary Standard, concretes are described as Types S, N, L, L_1, L_2, L40S, $L_1$20S or $L_2$20S as described in Sentences (2) to (8).

(2) Type S concrete is the type in which the coarse aggregate is granite, quartzite, siliceous gravel or other dense materials containing at least 30% quartz, chert or flint.

(3) Type N concrete is the type in which the coarse aggregate is cinders, broken brick, blast furnace slag, limestone, calcareous gravel, trap rock, sandstone or similar dense material containing not more than 30% of quartz, chert or flint.

(4) Type L concrete is the type in which all the aggregate is expanded slag, expanded clay, expanded shale or pumice.

(5) Type L_1 concrete is the type in which all the aggregate is expanded shale.

(6) Type L_2 concrete is the type in which all the aggregate is expanded slag, expanded clay or pumice.

(7) Type L40S concrete is the type in which the fine portion of the aggregate is sand and low density aggregate in which the sand does not exceed 40% of the total volume of all aggregates in the concrete.

(8) Type $L_1$20S and Type $L_2$20S concretes are the types in which the fine portion of the aggregate is sand and low density aggregate in which the sand does not exceed 20% of the total volume of all aggregates in the concrete.

1.4.2. Determination of Ratings

(1) Where concretes are described as being of Type S, N, L, L_1 or L_2, the rating applies to the concrete containing the aggregate in the group that provides the least fire resistance. If the nature of an aggregate cannot be determined accurately enough to place it in one of the groups, the aggregate shall be considered as being in the group that requires a greater thickness of concrete for the required fire resistance.

1.4.3. Description of Aggregates

(1) The descriptions of the aggregates in Type S and Type N concretes apply to the coarse aggregates only. Coarse aggregate for this purpose means that retained on a 5 mm sieve using the method of grading aggregates described in CAN/CSA-A23.1 / A23.2, "Concrete Materials and Methods of Concrete Construction / Methods of Test and Standard Practices for Concrete".

(2) Increasing the proportion of sand as fine aggregate in low density concretes requires increased thicknesses of material to produce equivalent fire-resistance ratings. Low density aggregates for Type L and Types L-S concretes used in loadbearing components shall conform to ASTM C330, "Lightweight Aggregates for Structural Concrete".

(3) Non-loadbearing low density components of vermiculite and perlite concrete, in the absence of other test evidence, shall be rated on the basis of the values shown for Type L concrete.

1.5. Gypsum Wallboard

1.5.1. Types of Wallboard

(1) Where the term gypsum wallboard is used in this Supplementary Standard, it is intended to include, in addition to gypsum wallboard, gypsum backing board and gypsum base for veneer plaster as described in
(a) CSA A82.27-M, "Gypsum Board",
(b) ASTM C36 / C36M, "Gypsum Wallboard",
(c) ASTM C37 / C37M, "Gypsum Lath",
(d) ASTM C442 / C442M, "Gypsum Backing Board, Gypsum Coreboard, and Gypsum Shaftliner Board",
(e) ASTM C588 / C588M, "Gypsum Base for Veneer Plasters",
(f) ASTM C630 / C630M, "Water-Resistant Gypsum Backing Board",
(g) ASTM C931 / C931M, "Exterior Gypsum Soffit Board", or
(h) ASTM C960 / C960M, "Predecorated Gypsum Board".

(2) Where the term Type X gypsum wallboard is used in this Supplementary Standard, it applies to special fire-resistant board as described in
(a) CSA A82.27-M, "Gypsum Board",
(b) ASTM C36 / C36M, "Gypsum Wallboard",
(c) ASTM C442 / C442M, "Gypsum Backing Board, Gypsum Coreboard, and Gypsum Shaftliner Board",
(d) ASTM C588 / C588M, "Gypsum Base for Veneer Plasters",

(e) ASTM C630 / C630M, "Water-Resistant Gypsum Backing Board",
(f) ASTM C931 / C931M, "Exterior Gypsum Soffit Board", or
(g) ASTM C960 / C960M, "Predecorated Gypsum Board".

1.6. Equivalent Thickness

1.6.1. Method of Calculating

(1) The thickness of solid-unit masonry and concrete described in this Supplementary Standard shall be the thickness of solid material in the unit or component thickness. For units that contain cores or voids, the Tables refer to the equivalent thickness determined in conformance with Sentences (2) to (10).

(2) Where a plaster finish is used, the equivalent thickness of a wall, floor, column or beam protection shall be equal to the sum of the equivalent thicknesses of the concrete or masonry units and the plaster finish measured at the point that will give the least value of equivalent thickness.

(3) Except as provided in Sentence (5), the equivalent thickness of a hollow masonry unit shall be calculated as equal to the actual overall thickness of a unit in millimetres multiplied by a factor equal to the net volume of the unit and divided by its gross volume.

(4) Net volume shall be determined using a volume displacement method that is not influenced by the porous nature of the units.

(5) Gross volume of a masonry unit shall be equal to the actual length of the unit multiplied by the actual height of the unit multiplied by the actual thickness of the unit.

(6) Where all the core spaces in a wall of hollow concrete masonry or hollow-core precast concrete units are filled with grout, mortar, or loose fill materials such as expanded slag, burned clay or shale (rotary kiln process), vermiculite or perlite, the equivalent thickness rating of the wall shall be considered to be the same as that of a wall of solid units, or a solid wall of the same concrete type and the same overall thickness.

(7) The equivalent thickness of hollow-core concrete slabs and panels having a uniform thickness and cores of constant cross section throughout their length shall be obtained by dividing the net cross-sectional area of the slab or panel by its width.

(8) The equivalent thickness of concrete panels with tapered cross sections shall be the cross section determined at a distance of 2 t or 150 mm, whichever is less, from the point of minimum thickness, where t is the minimum thickness.

(9) Except as permitted in Sentence (10), the equivalent thickness of concrete panels with ribbed or undulating surfaces shall be
(a) t_e for s less than or equal to 2 t,
(b) $t + (4t/s - 1)(t_e - t)$ for s less than 4 t and greater than 2 t, and
(c) t for s greater than or equal to 4 t

where

t = minimum thickness of panel,
t_e = average thickness of panel (unit cross-sectional area divided by unit width), and
s = centre to centre spacing of ribs or undulations.

(10) Where the total thickness of a panel described in Sentence (9), exceeds 2 t, only that portion of the panel which is less than 2 t from the nonribbed surface shall be considered for the purpose of the calculations in Sentence (9).

1.7. Contribution of Plaster or Gypsum Wallboard Finish to Fire Resistance of Masonry or Concrete

1.7.1. Determination of Contribution

(1) Except as provided in Sentences (2) to (5), the contribution of a plaster or gypsum wallboard finish to the fire resistance of a masonry or concrete wall, floor or roof assembly shall be determined by multiplying the actual thickness of the finish by the factor shown in Table 1.7.1., depending on the type of masonry or concrete to which it is applied. This corrected thickness shall then be included in the equivalent thickness as described in Section 1.6.

Table 1.7.1.
Multiplying Factors for Masonry or Concrete Construction

Type of Surface Protection	Type of Masonry or Concrete			
	Solid Clay Brick, Unit Masonry and Monolithic Concrete, Type N or S	Cored Clay Brick, Clay Tile, Monolithic Concrete Type L40S and Unit Masonry, Type L,20S	Concrete Unit Masonry, Type L, or L220S and Monolithic Concrete, Type L	Concrete Unit Masonry Type L,
Portland cement-sand plaster or lime sand plaster	1	0.75	0.75	0.50
Gypsum-sand plaster, wood fibred gypsum plaster or gypsum wallboard	1.25	1	1	1
Vermiculite or perlite aggregate plaster	1.75	1.5	1.25	1.25

(2) Where a plaster or gypsum wallboard finish is applied to a concrete or masonry wall, the calculated fire-resistance rating of the assembly shall not exceed twice the fire-resistance rating provided by the masonry or concrete because structural collapse may occur before the limiting temperature is reached on the surface of the non-fire-exposed side of the assembly.

(3) Where a plaster or gypsum wallboard finish is applied only on the non-fire-exposed side of a hollow clay tile wall, no increase in fire resistance is permitted because structural collapse may occur before the limiting temperature is reached on the surface of the non-fire-exposed side of the assembly.

(4) The contribution to fire resistance of a plaster or gypsum wallboard finish applied to the non-fire-exposed side of a monolithic concrete or unit masonry wall shall be determined in conformance with Sentence (1), but shall not exceed 0.5 times the contribution of the concrete or masonry wall.

(5) When applied to the fire-exposed side, the contribution of a gypsum lath and plaster or gypsum wallboard finish to the fire resistance of masonry or concrete wall, floor or roof assemblies shall be determined from Table 2.3.4.A. or 2.3.4.B.

1.7.2. Plaster

(1) Gypsum plastering shall conform to CSA A82.30-M, "Interior Furring, Lathing and Gypsum Plastering".

(2) Portland cement-sand plaster shall be applied in 2 coats: the first coat containing 1 part Portland cement to 2 parts sand by volume, and the second coat containing 1 part Portland cement to 3 parts sand by volume.

(3) Plaster finish shall be securely bonded to the wall or ceiling.

(4) The thickness of plaster finish applied directly to monolithic concrete without metal lath shall not exceed 10 mm on ceilings and 16 mm on walls.

(5) Where the thickness of plaster finish on masonry or concrete exceeds 38 mm, wire mesh with 1.57 mm diam wire and openings not exceeding 50 mm by 50 mm shall be embedded midway in the plaster.

1.7.3. Attachment of Wallboard and Lath

(1) Gypsum wallboard and gypsum lath finishes applied to masonry or concrete walls shall be secured to wood or steel furring members in conformance with Subsection 2.3.9.

1.7.4. Sample Calculations

(1) The following examples are included as a guide to the method of calculating the fire resistance of concrete or hollow masonry walls with plaster or gypsum wallboard protection:

Example (1)

A 3 h fire-resistance rating is required for a monolithic concrete wall of Type S aggregate with a 20 mm gypsum-sand plaster finish on metal lath on each face.

(a) The minimum equivalent thickness of Type S monolithic concrete needed to give a 3 h fire-resistance rating = 158 mm (Table 2.1.1.).
(b) Since the gypsum-sand plaster finish is applied on metal lath, Sentence 1.7.1.(5) does not apply. Therefore, the contribution to the equivalent thickness of the wall of 20 mm gypsum-sand plaster on each face of the concrete is 20 x 1.25 = 25 mm (see Sentences 1.7.1.(1) to (4)).
(c) The total contribution of the plaster finishes is 2 x 25 = 50 mm.
(d) The minimum equivalent thickness of concrete required is 158 mm - 50 mm = 108 mm.
(e) From Table 2.1.1., the 108 mm equivalent thickness of monolithic concrete gives a contribution of less than 1.5 h. This is less than half the rating of the assembly so that the conditions in Sentence 1.7.1.(2) are not met. Thus the equivalent thickness of monolithic concrete must be increased to 112 mm to give 1.5 h contribution.
(f) The total equivalent thickness of the plaster finishes can then be reduced to 158 mm - 112 mm = 46 mm.
(g) The total actual thickness of the plaster finishes required is therefore 46 mm ÷ 1.25 = 37 mm (Sentences 1.7.1.(1) to (4)) or 18.5 mm on each face.
(h) Since the thickness of the plaster finish on each face exceeds 16 mm, metal lath is still required (Sentence 1.7.2.(4)).
(i) Since this wall is symmetrical with plaster on both faces, the contribution to fire resistance of the plaster finish on either face is limited to one-quarter of the wall rating by virtue of Sentence 1.7.1.(2). Under these circumstances, the conditions in Sentence 1.7.1.(4) are automatically met.

Example (2)

A 2 h fire-resistance rating is required for a hollow masonry wall of Type N concrete with a 12.7 mm Type X gypsum wallboard finish on each face.

(a) Since gypsum wallboard is used, Sentence 1.7.1.(5) applies. The 12.7 mm gypsum wallboard finish on the fire-exposed side is, therefore, assigned 25 min by using Table 2.3.4.A.
(b) The fire resistance required of the balance of the assembly is 120 min - 25 min = 95 min.
(c) Interpolating between 1.5 h and 2 h in Table 2.1.1. for 95 min fire resistance, the equivalent thickness for hollow masonry units required is 95 mm + (18 mm x 5/30) = 95 mm + 3 mm = 98 mm.
(d) The contribution to the equivalent thickness of the wall of the 12.7 mm gypsum wallboard finish on the non-fire-exposed side using Table 1.7.1. = 12.7 x 1.25 = 16 mm.
(e) Equivalent thickness required of concrete masonry unit = 98 - 16 = 82 mm.

(f) The fire-resistance rating of a concrete masonry wall having an equivalent thickness of 82 mm = 1 h for 73 mm + (9 mm x 30/22) = 1 h 12 min. As this is more than 1 h, the conditions of Sentence 1.7.1.(2) are met and the rating of 2 h is justified.

Example (3)

A 2 h fire-resistance rating is required for a hollow masonry exterior wall of Type L$_1$20S concrete with a 15.9 mm Type X gypsum wallboard finish on the non-fire-exposed side only.

(a) According to Table 2.1.1., the minimum equivalent thickness for Type L$_1$20S concrete masonry units needed to achieve a 2 h rating is 94 mm.
(b) Since gypsum wallboard is not used on the fire-exposed side, Sentence 1.7.1.(5). does not apply. The contribution to the equivalent thickness of the wall by the 15.9 mm Type X gypsum wallboard finish applied on the non-fire-exposed side is 15.9 x 1 = 16 mm (see Sentence 1.7.1.(1) and Table 1.7.1.).
(c) Therefore, the equivalent thickness required of the concrete masonry unit is 94 - 16 = 78 mm.
(d) The contribution to fire resistance of a 78 mm L$_1$20S concrete hollow masonry unit is 85 min. The contribution of the Type X gypsum wallboard finish is 120 - 85 = 35 min, which does not exceed half the 85 min contribution of the masonry unit or 42.5 min, so that the conditions in Sentence 1.7.1.(4) are met.
(e) The rating of the wall (120 min) is less than twice the contribution of the masonry unit (170 min) so that the conditions in Sentence 1.7.1.(2) are also met.

1.8. Tests on Floors and Roofs

1.8.1. Exposure to Fire

(1) All tests relate to the performance of a floor assembly or floor-ceiling or roof-ceiling assembly above a fire. It has been assumed on the basis of experience that fire on top will take a longer time to penetrate the floor than one below, and that the fire resistance in such a situation will be at least equal to that obtained from below in the standard test.

1.9. Moisture Content

1.9.1. Effect of Moisture

(1) The moisture content of building materials at the time of fire test may have a significant influence on the measured fire resistance. In general, an increase in the moisture content should result in an increase in the fire resistance, though in some materials the presence of moisture may produce disruptive effects and early collapse of the assembly.

(2) Moisture content is now controlled in standard fire test methods and is generally recorded in the test reports. In earlier tests, moisture content was not always properly determined.

1.10. Permanence and Durability

1.10.1. Test Conditions

(1) The ratings in this Supplementary Standard relate to tested assemblies and do not take into account possible changes or deterioration in use of the materials. The standard fire test measures the fire resistance of a sample building assembly erected for the test. No judgment as to the permanence or durability of the assembly is made in the test.

1.11. Steel Structural Members

1.11.1. Thermal Protection

(1) Since the ability of a steel structural member to sustain the loading for which it was designed may be impaired because of elevated temperatures, measures shall be taken to provide thermal protection. The fire-resistance ratings, as established by the provisions of this Supplementary Standard, indicate the time periods during which the effects of heat on protected steel structural members are considered to be within acceptable limits.

1.12. Restraint Effects

1.12.1. Effect on Fire-Resistance Ratings

(1) In fire tests of floors, roofs and beams, it is necessary to state whether the rating applies to a thermally restrained or thermally unrestrained assembly. Edge restraint of a floor or roof, structural continuity, or end restraint of a beam can significantly extend the time before collapse in a standard test. A restrained condition is one in which expansion or rotation at the supports of a load-carrying element resulting from the effects of fire is resisted by forces or moments external to the element. An unrestrained condition is one in which the load-carrying element is free to thermally expand and rotate at its supports.

Whether an assembly or structural member can be considered thermally restrained or thermally unrestrained depends on the type of construction and location in a building. Guidance on this subject can be found in Appendix A1 of CAN/ULC-S101-M, "Fire Endurance Tests of Building Construction and Materials". Different acceptance criteria also apply to thermally unrestrained and thermally restrained assemblies. These are described in CAN/ULC-S101-M.

The ratings for floors, roofs, and beams in this Supplementary Standard meet the conditions of CAN/ULC-S101-M, " Fire Endurance Tests of Building Construction and Materials" for thermally unrestrained specimens. In a thermally restrained condition, the structural element or assembly would probably have greater fire resistance, but the extent of this increase can be determined only by reference to behavior in a standard test.

Section 2 Fire-Resistance Ratings

2.1. Masonry and Concrete Walls

2.1.1. Minimum Equivalent Thickness for Fire-Resistance Rating

(1) The minimum thicknesses of unit masonry and monolithic concrete walls are shown in Table 2.1.1. Hollow masonry units and hollow-core concrete panels shall be rated on the basis of equivalent thickness as described in Section 1.6.

2.1.2. Applicability of Ratings

(1) Ratings obtained as described in Subsection 2.1.1. apply to either loadbearing or non-loadbearing walls, except for walls described in Sentences (2) to (6).

(2) Ratings for walls with a thickness less than the minimum thickness prescribed for loadbearing walls in this Supplemenary Standard apply to non-loadbearing walls only.

(3) Masonry cavity walls (consisting of 2 wythes of masonry with an air space between) that are loaded to a maximum allowable compressive stress of 380 kPa have a fire resistance at least as great as that of a solid wall of a thickness equal to the sum of the equivalent thicknesses of the 2 wythes.

(4) Masonry cavity walls that are loaded to a compressive stress exceeding 380 kPa are not considered to be within the scope of this Supplementary Standard.

(5) A masonry wall consisting of 2 types of masonry units, either bonded together or in the form of a cavity wall, shall be considered to have a fire-resistance rating equal to that which would apply if the whole of the wall were of the material that gives the lesser rating.

(6) A non-loadbearing cavity wall made up of 2 precast concrete panels with an air space or insulation in the cavity between them shall be considered to have a fire-resistance rating as great as that of a solid wall of a thickness equal to the sum of the thicknesses of the 2 panels.

2.1.3. Framed Beams and Joists

(1) Beams and joists that are framed into a masonry or concrete fire separation shall not reduce the thickness of the fire separation to less than the equivalent thickness required for the fire separation.

2.1.4. Credit for Plaster Thickness

(1) On monolithic walls and walls of unit masonry, the full plaster finish on one or both faces multiplied by the factor shown in Table 1.7.1. shall be included in the wall thickness shown in Table 2.1.1., under the conditions and using the methods described in Section 1.7.

Table 2.1.1.
Minimum Equivalent Thicknesses(1) of Unit Masonry and Monolithic Concrete Walls Loadbearing and Non-Loadbearing, mm

Type of Wall	Fire-Resistance Rating						
	30 min	45 min	1 h	1.5 h	2 h	3 h	4 h
Solid brick units (80% solid and over), actual overall thickness	63	76	90	108	128	152	178
Cored brick units and hollow tile units (less than 80% solid), equivalent thickness	50	60	72	86	102	122	142
Solid and hollow concrete masonry units, equivalent thickness							
Type S or N concrete(2)	44	59	73	95	113	142	167
Type $L_1$20S concrete	42	54	66	87	102	129	152
Type L_1 concrete	42	54	64	82	97	122	143
Type $L_2$20S concrete	42	54	64	81	94	116	134
Type L_2 concrete	42	54	63	79	91	111	127
Monolithic concrete and concrete panels, equivalent thickness							
Type S concrete	60	77	90	112	130	158	180
Type N concrete	59	74	87	108	124	150	171
Type L40S or Type L concrete	49	62	72	89	103	124	140

Notes to Table 2.1.1.:

(1) See definition of equivalent thickness in Section 1.6.

(2) Hollow concrete masonry units made with Type S or N concrete shall have a minimum compressive strength of 15 MPa based on net area, as defined in CSA A165.1, "Concrete Block Masonry Units".

2.1.5. Walls Exposed to Fire on Both Sides

(1) Except as permitted in Sentence (2), portions of loadbearing reinforced concrete walls, which do not form a complete fire separation and thus may be exposed to fire on both sides simultaneously, shall have minimum dimensions and minimum cover to steel reinforcement in conformance with Subsections 2.8.2. to 2.8.5.

(2) A concrete wall exposed to fire from both sides as described in Sentence (1) has a fire-resistance rating of 2 h if the following conditions are met:
(a) its equivalent thickness is not less than 200 mm,
(b) its aspect ratio (width/thickness) is not less than 4.0,
(c) the minimum thickness of concrete cover over the steel reinforcement specified in Clause (d) is not less than 50 mm,
(d) each face of the wall is reinforced with both vertical and horizontal steel reinforcement in conformance with either Clause 10 or Clause 14 of CSA A23.3, "Design of Concrete Structures",
(e) the structural design of the wall is governed by the minimum eccentricity requirements of Clause 10.11.6.3. of CSA A23.3, "Design of Concrete Structures", and
(f) the effective length of the wall, kl_u, is not more than 3.7 m.

where

k = effective length factor obtained from CSA A23.3, "Design of Concrete Structures",
l_u = unsupported length of the wall in metres

2.2. Reinforced and Prestressed Concrete Floor and Roof Slabs

2.2.1. Assignment of Rating

(1) Floors and roofs in a fire test are assigned a fire-resistance rating which relates to the time that an average temperature rise of 140°C or a maximum temperature rise of 180°C at any location is recorded on the unexposed side, or the time required for collapse to occur, whichever is the lesser. The thickness of concrete shown in Table 2.2.1.A. shall be required to resist the transfer of heat during the fire resistance period shown.

Table 2.2.1.A.
Minimum Thickness of Reinforced and Prestressed Concrete Floor or Roof Slabs, mm

Type of Concrete	Fire-Resistance Rating						
	30 min	45 min	1 h	1.5 h	2 h	3 h	4 h
Type S concrete	60	77	90	112	130	158	180
Type N concrete	59	74	87	108	124	150	171
Type L40S or Type L concrete	49	62	72	89	103	12	140

(2) The concrete cover over the reinforcement and steel tendons shown in Table 2.2.1.B. shall be required to maintain the integrity of the structure and prevent collapse during the same period.

Table 2.2.1.B.
Minimum Concrete Cover over Reinforcement in Concrete Slabs, mm

Type of Concrete	Fire-Resistance Rating						
	30 min	45 min	1 h	1.5 h	2 h	3 h	4 h
Type S, N, L40S or L concrete	20	20	20	20	25	32	39
Prestressed concrete slabs Type S, N, L40S or L concrete	20	25	25	32	39	50	64

2.2.2. Floors with Hollow Units

(1) The fire resistance of floors containing hollow units may be determined on the basis of equivalent thickness as described in Section 1.6.

2.2.3. Composite Slabs

(1) For composite concrete floor and roof slabs consisting of one layer of Type S or N concrete and another layer of Type L40S or L concrete in which the minimum thickness of both the top and bottom layers is not less than 25 mm, the combined fire-resistance rating may be determined using the following expressions:

(a) when the base layer consists of Type S or N concrete,

$$R = 0.00018t^2 - 0.00009dt + \frac{8.7}{(t)}$$

(b) when the base layer consists of Type L40S or L concrete,

$$R = 0.0001t^2 + 0.0002dt - 0.0001d^2 - \frac{6.4}{(t)}$$

where

R = fire resistance of slab, h,
t = total thickness of slab, mm, and
d = thickness of base layer, mm.

(2) If the base course described in Sentence (1) is covered by a top layer of material other than Type S, N, L40S or L concrete, the top course thickness may be converted to an equivalent concrete thickness by multiplying the actual thickness by the appropriate factor listed in Table 2.2.3.A. This equivalent concrete thickness may be added to the thickness of the base course and the fire-resistance rating calculated using Table 2.2.1.A.

(3) The minimum concrete cover under the main reinforcement for composite concrete floor and roof slabs with base slabs less than 100 mm thick shall conform to Table 2.2.3.B. For base slabs 100 mm or more thick, the minimum cover thickness requirements of Table 2.2.1.B. shall apply.

(4) Where the top layer of a 2-layer slab is less than 25 mm thick, the fire-resistance rating for the slab shall be calculated as though the entire slab were made up of the type of concrete with the lesser fire resistance.

Table 2.2.3.A.
Multiplying Factors for Equivalent Thickness

Top Course Material	Base Slab Normal Density Concrete (Type S or N)	Base Slab Low Density Concrete (Type L40S or L)
Gypsum wallboard	3	2.25
Cellular concrete (mass density 400 - 560 kg/m^3)	2	1.50
Vermiculite and perlite concrete (mass density 560 kg/m^3 or less)	1.75	1.50
Portland cement with sand aggregate	1	0.75
Terrazzo	1	0.75

Table 2.2.3.B.
Minimum Concrete Cover under Bottom Reinforcement in Composite Concrete Slabs, mm

Base Slab Concrete Type	Fire-Resistance Rating						
	30 min	45 min	1 h	1.5 h	2 h	3 h	4 h
Reinforced concrete							
Type S, N, L40S or L	15	15	20	25	30	40	55
Prestressed concrete							
Type S	20	25	30	40	50	65	75
Type N	20	20	25	35	45	60	70
Type L40S or L	20	20	25	30	40	50	60

2.2.4. Contribution of Plaster Finish

(1) The contribution of plaster finish securely fastened to the underside of concrete may be taken into account in floor or roof slabs under the conditions and using the methods described in Section 1.7.

(2) Plaster finish on the underside of concrete floors or roofs may be used in lieu of concrete cover referred to in Sentence 2.2.1.(2) under the conditions and using the methods described in Section 1.7.

2.2.5. Concrete Cover

(1) In prestressed concrete slab construction, the concrete cover over an individual tendon shall be the minimum thickness of concrete between the surface of the tendon and the fire-exposed surface of the slab, except that for ungrouted ducts the assumed cover thickness shall be the minimum thickness of concrete between the surface of the duct and the bottom of the slab. For slabs in which several tendons are used, the cover is assumed to be the average of those of individual tendons, except that the cover for any individual tendon shall be not less than half of the value given in Table 2.2.1.B, nor less than 20 mm.

(2) Except as provided in Sentence (3), in post-tensioned prestressed concrete slabs, the concrete cover to the tendon at the anchor shall be not less than 15 mm greater than the minimum cover required by Sentence (1). The minimum concrete cover to the anchorage bearing plate and to the end of the tendon, if it projects beyond the bearing plate, shall be 20 mm.

(3) The requirements of Sentence (2) do not apply to those portions of slabs not likely to be exposed to fire, such as the ends and tops.

2.2.6. Minimum Dimensions for Cover

(1) Minimum dimensions and cover to steel tendons of prestressed concrete beams shall conform to Section 2.10.

2.3. Wood and Steel Framed Walls, Floors and Roofs

2.3.1. Maximum Fire-Resistance Rating

(1) The fire-resistance rating of walls constructed of wood studs or light gauge steel studs, floors constructed of wood joists or open web steel joists, and roofs constructed of wood joists, pre-manufactured wood trusses or open web steel joists, can be determined for ratings up to 90 min from the information in Section 2.3.

2.3.2. Loadbearing Conditions

(1) The ratings derived from the information in Section 2.3. apply to both loadbearing and non-loadbearing wood framed walls, to non-loadbearing steel framed walls and to loadbearing floors and roofs.

(2) Loadbearing conditions shall be as defined in CAN/ULC-S101, " Fire Endurance Tests of Building Construction and Materials".

2.3.3. Limitations of Component Additive Method

(See Section 6 Background Information.)

(1) The fire-resistance rating of a framed assembly depends primarily on the time during which the membrane on the fire-exposed side remains in place.

(2) The assigned times in Sentences 2.3.4.(2) to (4) are not intended to be construed as the fire-resistance ratings of the individual components of an assembly. These assigned times are the individual contributions to the overall fire-resistance rating of the complete assembly.

(3) Wallboard membranes are permitted to be installed in multiple layers only as listed in Table 2.3.4.A. (Double 12.7 mm Type X gypsum wallboard).

2.3.4. Method of Calculation

(1) The fire-resistance rating of a framed assembly may be calculated by adding the time assigned in Sentence (2) for the membrane on the fire-exposed side plus the time assigned in Sentence (3) for the framing members plus the time assigned in Sentence (4) for additional protective measures such as the inclusion of insulation or the reinforcement of a membrane.

(2) The times which have been assigned to membranes on the fire-exposed side of the assembly, based on their ability to remain in place during fire tests, are listed in Tables 2.3.4.A. and 2.3.4.B. (This is not to be confused with the fire-resistance rating of the membrane, which also takes into account the rise in temperature on the unexposed side of the membrane. [See Sentence 2.3.3.(2).])

Table 2.3.4.A.
Time Assigned to Wallboard Membranes on Fire-Exposed Side

Description of Finish	Time, min
11.0 mm Douglas Fir plywood phenolic bonded	10(1)
14.0 mm Douglas Fir plywood phenolic bonded	15(1)
12.7 mm Type X gypsum wallboard	25
15.9 mm Type X gypsum wallboard	40
Double 12.7 mm Type X gypsum wallboard	80(2)

Notes to Table 2.3.4.A.:

(1) Non-loadbearing walls only, stud cavities filled with mineral wool conforming to CAN/ULC-S702, "Mineral Fibre Thermal Insulation for Buildings", and having a mass of not less than 2 kg/m², with no additional credit for insulation according to Table 2.3.4.D.

(2) Applies to non-loadbearing steel framed walls only.

Table 2.3.4.B.
Time Assigned for Contribution of Lath and Plaster Protection on Fire-Exposed Side, min(1)

Type of Lath	Plaster Thickness, mm	Type of Plaster Finish		
		Portland Cement and Sand(2) or Lime and Sand	Gypsum and Sand or Gypsum Wood Fibred	Gypsum and Perlite or Gypsum and Vermiculite
9.5 mm gypsum	13	—	35	55
	16	—	40	65
	19	—	50	80(1)
Metal	19	20	50	80(1)
	23	25	65	80(1)
	26	30	80	80(1)

Notes to Table 2.3.4.B.:

(1) Values shown for these membranes have been limited to 80 min because the fire-resistance ratings of framed assemblies derived from these Tables shall not exceed 1.5 h.

(2) For mixture of Portland cement-sand plaster, see Sentence 1.7.2.(2).

(3) When the membrane on the fire-exposed side of a framed assembly falls off, there is a brief period before structural failure occurs during which the studs or joists are exposed directly to flame. Table 2.3.4.C. lists the times which have been assigned to the framing members based on the time involved between failure of the membrane and collapse of the assembly.

(4) Preformed insulation of glass, rock or slag fibre provides additional protection to wood studs by shielding the studs from exposure to the fire and thus delaying the time of collapse. The use of reinforcement in the membrane exposed to fire also adds to the fire resistance by extending the time to failure. Table 2.3.4.D. shows the time increments that may be added to the fire resistance if these features are incorporated in the assembly.

(5) Cellulose fibre insulation conforming to CAN/ULC-S703, "Cellulose Fibre Insulation (CFI) for Buildings", applied in conformance with CGSB-92.2-M, "Trowel or Spray Applied Acoustical Material," does not affect the fire-resistance rating of a steel stud wall assembly, provided that it is sprayed to either face of the wall cavity.

Table 2.3.4.C.
Time Assigned for Contribution of Wood or Light Steel Frame

Description of Frame	Time Assigned to Frame, min
Wood studs 400 mm o.c. maximum	20
Wood studs 600 mm o.c. maximum	15
Steel studs 400 mm o.c. maximum	10
Wood floor and wood roof joists 400 mm o.c. maximum	10
Open web steel joist floors and roofs with ceiling supports 400 mm o.c. maximum	10
Wood roof and wood floor truss assemblies 600 mm o.c. maximum	5

Table 2.3.4.D.
Time Assigned for Additional Protection

Description of Additional Protection	Time Assigned, min
Add to the fire-resistance rating of wood stud walls, sheathed with gypsum wallboard or lath and plaster, if the spaces between the studs are filled with preformed insulation of rock or slag fibres conforming to CAN/ULC-S702, "Mineral Fibre Thermal Insulation for Buildings", and with a mass of not less than 1.22 kg/m^2 of wall surface(1)	15
Add to the fire-resistance rating of non-loadbearing wood stud walls, sheathed with gypsum wallboard or lath and plaster, if the spaces between the studs are filled with preformed insulation of glass fibres conforming to CAN/ULC-S702, "Mineral Fibre Thermal Insulation for Buildings", and having a mass of not less than 0.6 kg/m^2 of wall surface	5
Add to the fire-resistance rating of plaster on gypsum lath ceilings if 0.76 mm diam wire mesh with 25 mm by 25 mm openings or 1.57 mm diam diagonal wire reinforcing at 250 mm o.c. is placed between lath and plaster	30
Add to the fire-resistance rating of plaster on gypsum lath ceilings if 76 mm wide metal lath strips are placed over joints between lath and plaster	10
Add to the fire-resistance rating of plaster on 9.5 mm thick gypsum lath ceilings (Table 2.3.4.B.) if supports for lath are 300 mm o.c.	10

Notes to Table 2.3.4.D.:

(1) There are no test data to justify the 15 min additional protection for preformed glass fibre.

2.3.5. Considerations for Various Types of Assemblies

(1) Interior vertical fire separations shall be rated for exposure to fire on each side, and a membrane shall be provided on both sides of the assembly. In the calculation of the fire-resistance rating of such an assembly, however, no contribution to fire-resistance can be assigned for a membrane on the non-fire-exposed side, since this membrane may fail when the structural members fail.

(2) When an exterior wall assembly is required to be rated from the interior side only, such wall assemblies shall have an outer membrane consisting of sheathing and exterior cladding with spaces between the studs filled with insulation conforming to CAN/ULC-S702, "Mineral Fibre Thermal Insulation for Buildings", and having a mass of not less than 1.22 kg/m^2 of wall surface.

(3) In the case of a floor or roof, the standard test provides only for testing for fire exposure from below. Floor or roof assemblies of wood, light-gauge steel members or open-web steel joist framing shall have an upper membrane consisting of a subfloor and finish floor conforming to Table 2.3.5. or any other membrane that has a contribution to fire resistance of not less than 15 min in Table 2.3.4.A. For the purposes of this requirement, it is not necessary to comply with note (1) to Table 2.3.4.A.

Table 2.3.5.
Flooring of Roofing Membranes for Wood, Cold Formed Steel Members or Open-Web Steel Joists

Type of Assembly	Structural Members	Subfloor or Roof Deck	Finish Flooring or Roofing
Floor	Wood or steel joists and wood trusses	12.5 mm plywood or 17 mm T & G softwood	Hardwood or softwood flooring on building paper Resilient flooring, parquet floor, felted synthetic fibre floor coverings, carpeting, or ceramic tile on 8 mm thick panel-type underlay Ceramic tile on 30 mm mortar bed
	Steel joists	50 mm reinforced concrete or 50 mm concrete on metal lath or formed steel sheet, or 40 mm reinforced gypsum-fibre concrete on 12.7 mm gypsum wallboard	Finish flooring
Roof	Wood or steel joists and wood trusses	12.5 mm plywood or 17 mm T & G softwood	Finish roofing material with or without insulation
	Steel joists	50 mm reinforced concrete or 50 mm concrete on metal lath or formed steel sheet, or 40 mm reinforced gypsum-fibre concrete on 12.7 mm gypsum wallboard	Finish roofing material with or without insulation

(4) Insulation used in the cavities of a wood floor assembly will not reduce the assigned fire-resistance rating of the assembly provided:

(a) the insulation is preformed of rock, slag or glass fibre conforming to CAN/ULC-S702, "Mineral Fibre Thermal Insulation for Buildings", and having a mass of not more than 1.1 kg/m^2 and is installed adjacent to the bottom edge of the framing member, directly above steel furring channels,

(b) the gypsum wallboard ceiling membrane is attached to

  (i) wood trusses in conformance with Sentence 2.3.9.(2) by way of steel drywall furring channels spaced not more than 400 mm o.c., and the channels are secured to each bottom truss member with a double strand of 1.2 mm galvanized steel wire, or

  (ii) wood joists by way of drywall or resilient steel furring channels spaced not more than 400 mm o.c. in conformance with Sentences 2.3.9.(2) and (3), and

(c) a steel furring channel is installed midway between each furring channel mentioned in Clause (b) to provide additional support for the insulation.

2.3.6. Framing Members

(1) The values shown in Tables 2.3.4.A., 2.3.4.B. and 2.3.12. apply to membranes supported on framing members installed in their conventional orientation and spaced in conformance with Table 2.3.4.C.

(2) Wood studs and wood roof and floor framing members are assumed to be not less than 38 mm by 89 mm. Wood trusses are assumed to consist of wood chord and web framing members and connector plates fabricated from not less than 1 mm thick galvanized steel with projecting teeth not less than 8 mm long. Dimensions for dressed lumber are given in CAN/CSA-O141, "Softwood Lumber".

(3) The allowable spans for wood joists listed in Part 9 of Division B are provided for floors supporting specific occupancies.

(4) Except as otherwise required in this Supplementary Standard, metal studs shall be of galvanized steel not less than 0.5 mm thick, not less than 63 mm wide and with a flange width of not less than 31 mm.

(5) Metal studs in walls required to have a fire- resistance rating shall be installed with not less than 12 mm clearance between the top of the stud and the top of the runner to allow for expansion in the event of fire. Where attachment of the studs is necessary for alignment purposes during erection, such attachment shall be made to the bottom runners only.

(6) Except as required in Sentence 2.3.5.(4), resilient or drywall furring channels may be used to attach a gypsum wallboard ceiling membrane to a floor or roof assembly. The channels must be of galvanized steel not less than 0.5 mm thick, placed at a spacing of not more than 600 mm o.c. perpendicular to the framing members, with an overlap of not less than 100 mm at splices and a minimum end clearance between the channels and walls of 15 mm.

2.3.7. Plaster Finish

(1) The thickness of plaster finish shall be measured from the face of gypsum or metal lath.

2.3.8. Edge Support for Wallboard

(1) Gypsum wallboard installed over framing or furring shall be installed so that all edges are supported, except that 15.9 mm Type X gypsum wallboard may be installed horizontally with the horizontal joints unsupported when framing members are at 400 mm o.c. maximum.

2.3.9. Membrane Fastening

(1) Except as provided in Sentences (2) to (6), the application of lath and plaster finish shall conform to CSA A82.30-M, "Interior Furring, Lathing and Gypsum Plastering", and gypsum wallboard finish shall conform to CSA A82.31-M, "Gypsum Board Application".

(2) Where a membrane referred to in Tables 2.3.4.A., 2.3.4.B. and 2.3.12. is applied to steel framing or furring, fasteners shall penetrate not less than 10 mm through the metal.

(3) Except as provided in Sentences (4) and (5) where a membrane referred to in Tables 2.3.4.A., 2.3.4.B. and 2.3.12. is applied to wood framing or furring, minimum fastener penetrations into wood members shall conform to Table 2.3.9. for the time assigned to the membrane.

(4) Where a membrane is applied in 2 layers, the fastener penetrations described in Table 2.3.9. shall apply to the base layer. Fasteners for the face layer shall penetrate not less than 20 mm into wood supports.

Table 2.3.9.
Minimum Fastener Penetrations for Membrane Protection on Wood Frame, mm

Type of Membrane	Assigned Contribution of Membrane to Fire Resistance,[1] min					
	5 - 25	30 - 35	40	50	55 - 70	80
Single layer	20	29	32	—	—	—
Double layer	20	20	20	29	35	44
Gypsum lath	20	20	23	23	29	29

Notes to Table 2.3.9.:

(1) Assigned contributions of membranes to fire resistance are determined in Tables 2.3.4.A., 2.3.4.B. and 2.3.12.

(5) Where adhesives are used to attach the face layer of gypsum wallboard in a double layer application for walls, the top and bottom of the face layer shall be secured to the supports by mechanical fasteners having lengths as required in Sentences (2) and (4) and spaced not more than 150 mm o.c. for wood supports and not more than 200 mm o.c. for steel supports.

(6) In a double layer application of gypsum wallboard on wood supports, fastener spacing shall conform to CSA A82.31-M, "Gypsum Board Application".

2.3.10. Ceiling Membrane Openings - Combustible Construction

(1) Except as permitted in Subsection 2.3.12., where a floor or roof assembly of combustible construction is assigned a fire-resistance rating on the basis of Section 2.3. and incorporates a ceiling membrane described in Table 2.3.4.A. or 2.3.4.B., the ceiling membrane may be penetrated by openings leading to ducts within concealed spaces above the membrane provided:

(a) the assembly is not required to have a fire-resistance rating in excess of 1 h,
(b) the area of any openings does not exceed 930 cm^2 (see Sentence (2)),
(c) the aggregate area of openings does not exceed 1% of the ceiling area of the fire compartment,
(d) the depth of the concealed space above the ceiling is not less than 230 mm,
(e) no dimension of any opening exceeds 310 mm,
(f) supports are provided for openings with any dimension exceeding 150 mm where framing members are spaced greater than 400 mm o.c.,
(g) individual openings are spaced not less than 2 m apart,
(h) the ducts above the membrane are sheet steel and are supported by steel strapping firmly attached to the framing members, and
(i) the clearance between the top surface of the membrane and the bottom surface of the ducts is not less than 100 mm.

(2) Where an individual opening permitted in Sentence (1) exceeds 130 cm^2 in area, it shall be protected by
(a) a fire stop flap conforming to Section 5.3., or
(b) thermal protection above the duct consisting of the same materials as used for the ceiling membrane, mechanically fastened to the ductwork and extending 200 mm beyond the opening on all sides (see Figure 2.3.10.).

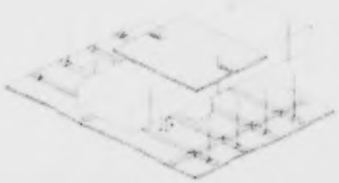


Figure 2.3.10.
Thermal Protection above a Duct

2.3.11. Ceiling Membrane Openings - Noncombustible Construction

(1) Except as permitted in Subsection 2.3.12., where a floor or roof assembly of noncombustible construction is assigned a fire-resistance rating on the basis of Section 2.3. and incorporates a ceiling membrane described in Table 2.3.4.A. or 2.3.4.B., the ceiling membrane may be penetrated by openings leading to ducts located within concealed spaces provided:

(a) the area of any opening does not exceed 930 cm^2 (see Sentence (2)),
(b) the aggregate area of openings does not exceed 2% of the ceiling area of the fire compartment,
(c) no dimension of any opening exceeds 400 mm,
(d) individual openings are spaced not less than 2 m apart,
(e) openings are located not less than 200 mm from major structural members such as beams, columns or joists,
(f) the ducts above the membrane are sheet steel and are supported by steel strapping firmly attached to the framing members, and
(g) the clearance between the top surface of the membrane and the bottom surface of the duct is not less than 100 mm.

(2) Where an individual opening permitted in Sentence (1) exceeds 130 cm^2 in area, it shall be protected by
(a) a fire stop flap conforming to Section 5.3., or
(b) thermal protection above the duct consisting of the same materials as used for the ceiling membrane, mechanically fastened to the ductwork and extending 200 mm beyond the opening on all sides (see Figure 2.3.10.).

2.3.12. Ceiling Membrane Rating

(1) Where the fire-resistance rating of a ceiling assembly is to be determined on the basis of the membrane only and not of the complete assembly, the ratings may be determined from Table 2.3.12., provided no openings are located within the ceiling membrane.

Table 2.3.12.
Fire-Resistance Rating for Ceiling Membranes

Description of Membrane	Fire-Resistance Rating, min
15.9 mm Type X gypsum wallboard with ≥75 mm mineral wool batt insulation above wallboard	30
19 mm gypsum-sand plaster on metal lath	30
Double 14.0 mm Douglas Fir plywood phenolic bonded	30
Double 12.7 mm Type X gypsum wallboard	45
25 mm gypsum-sand plaster on metal lath	45
Double 15.9 mm Type X gypsum wallboard	60
32 mm gypsum-sand plaster on metal lath	60

2.3.13. Beams

(1) Where a beam is included with an open-web steel joist or similar construction and is protected by the same continuous ceiling, the beam is assumed to have a fire-resistance rating equal to that assigned to the rest of the assembly.

(2) The ratings in this Supplementary Standard assume that the construction to which the beam is related is a normal one and does not carry unusual loads from the floor or slab above.

2.3.14. Wired Glass Assemblies

(1) Openings in a vertical fire separation having a fire-resistance rating of not more than 1 h are allowed to be protected by wired glass assemblies, provided the wired glass is
(a) not less than 6 mm thick;
(b) reinforced by a steel wire mesh in the form of diamonds, squares or hexagons having dimensions of
    (i) approximately 25 mm across the flats, using wire of not less than 0.45 mm diam. or
    (ii) approximately 13 mm across the flats, using wire of not less than 0.40 mm diam. the wire to be centrally embedded during manufacture and welded or intertwined at each intersection;
(c) set in fixed steel frames with metal not less than 1.35 mm thick and providing a glazing stop of not less than 20 mm on each side of the glass; and
(d) limited in area so that
    (i) individual panes are not more than 0.84 m^2, with neither height nor width more than 1.4 m, and
    (ii) the area not structurally supported by mullions is not more than 7.5 m^2.

(2) It is intended that the structural mullions referred to in Subclause(1)(d)(ii) will not distort or be displaced to the extent that there would be a failure of the wired glass closure during the period for which a closure in the fire separation would be expected to function. Hollow structural steel tubing not less than 100 mm square filled with a Portland cement-based grout will satisfy the intent of the Subclause.

2.4. Solid Wood Walls, Floors and Roofs

2.4.1. Minimum Thickness

(1) The minimum thickness of solid wood walls, floors and roofs for fire-resistance ratings from 30 min to 1.5 h is shown in Table 2.4.1.

Table 2.4.1.
Minimum Thickness of Solid Wood Walls, Roofs and Floors, mm(1)(2)

Type of Construction	Fire-Resistance Rating			
	30 min	45 min	1 h	1.5 h
Solid wood floor with building paper and finish flooring on top[3]	89	114	165	235
Solid wood, splined or tongued and grooved floor with building paper and finish flooring on top[4]	64	76	—	—
Solid wood walls of loadbearing vertical plank[3]	89	114	140	184
Solid wood walls of non-loadbearing horizontal plank[3]	89	89	89	140

Notes to Table 2.4.1.

(1) See CAN/CSA-O141, "Softwood Lumber", for sizes.

(2) The fire-resistance ratings and minimum dimensions for floors also apply to solid wood roof decks of comparable thickness with finish roofing material.

(3) The assembly shall consist of 38 mm thick members on edge fastened together with 101 mm common wire nails spaced not more than 400 mm o.c. and staggered in the direction of the grain.

(4) The floor shall consist of 64 mm by 184 mm wide planks either tongued and grooved or with 19 mm by 38 mm spines set in grooves and fastened together with 88 mm common nails spaced not more than 400 mm o.c.

2.4.2. Increased Fire-Resistance Rating

(1) The fire-resistance rating of the assemblies described in Table 2.4.1. may be increased by 15 min if one of the following finishes is applied on the fire-exposed side:

(a) 12.7 mm thick gypsum wallboard,

(b) 20 mm thick gypsum-sand plaster on metal lath, or

(c) 13 mm thick gypsum-sand plaster on 9.5 mm gypsum lath.

(2) Fastening of the plaster to the wood structure shall conform to Section 2.3.

2.4.3. Supplementary Ratings

Supplementary ratings based on tests are included in Table 2.4.3. The ratings given shall apply to constructions that conform in all details with the descriptions given.

Table 2.4.3.
Fire-Resistance Rating of Non-Loadbearing Built-up Solid Wood Partitions[1]

Construction Details	Actual Overall Thickness, mm	Fire-Resistance Rating
Solid panels of wood boards 64 mm to 140 mm wide grooved and joined with wood splines, nailed together, boards placed vertically with staggered joints, 3 boards thick	58	30 min
Solid panels with 4 mm plywood facings glued to 46 mm solid wood core of glued, tongued and grooved construction for both sides and ends of core pieces with tongued and grooved rails in the core about 760 mm apart	54	1 h

Notes to Table 2.4.3.

(1) The ratings and notes are taken from "Fire Resistance Classifications of Building Constructions", Building Materials and Structures Report BMS 92, National Bureau of Standards, Washington, 1942.

(2) Ratings for plywood faced panel are based on phenolic resin glue being used for gluing facings to wood frames. If other types of glue are used for this purpose, the ratings apply if the facings are nailed to the frames in addition to being glued.

2.5. Solid Plaster Partitions

2.5.1. Minimum Thickness

(1) The minimum thickness of solid plaster partitions for fire-resistance ratings from 30 min to 4 h is shown in Table 2.5.1.

Table 2.5.1.
Minimum Thickness of Non-Loadbearing Solid Plaster Partitions, mm

Type of Plaster on Metal Lath[1]	Fire-Resistance Rating						
	30 min	45 min	1 h	1.5 h	2 h	3 h	4 h
Portland cement-sand[2] or Portland cement-lime-sand	50[3]	—	—	—	—	—	—
Gypsum-sand	50[3]	50[3]	64	—	—	—	—
Gypsum-vermiculite, gypsum-perlite, Portland cement-vermiculite or Portland cement-perlite	50[3]	50[3]	50[3]	58	64	83	102

Notes to Table 2.5.1.:

(1) Metal lath shall be expanded metal lath or welded woven wire fabric supported on 19 mm vertical light steel studs spaced not more than 600 mm o.c. Plaster shall be applied to both sides of the lath.

(2) For mixture of Portland cement-sand plaster, see Sentence 1.7.2.(2).

(3) CSA A82.30-M, "Interior Furring, Lathing and Gypsum Plastering", does not permit solid plaster partitions less than 50 mm thick.

2.6. Protected Steel Columns

2.6.1. Minimum Thickness of Protective Covering

(1) The minimum thickness of protective covering to steel columns is shown in Tables 2.6.1.A. to 2.6.1.F. for fire-resistance ratings from 30 min to 4 h.

Table 2.6.1.A.
Minimum Thickness of Concrete or Masonry Protection to Steel Columns, mm

Description of Cover	Fire-Resistance Rating						
	30 min	45 min	1 h	1.5 h	2 h	3 h	4 h
Monolithic concrete							
Type S concrete [1] (column spaces filled)[2]	25	25	25	25	39	64	89
Type N or L concrete (column spaces filled)[2]	25	25	25	25	32	50	77
Concrete masonry units [3] or precast reinforced concrete units							
Type S concrete (column spaces not filled)	50	50	50	50	64	89	115
Type N or L concrete (column spaces not filled)	50	50	50	50	50	77	102
Clay or shale brick [4] (column spaces filled)	50	50	50	50	50	64	77
Clay or shale brick [4] (column spaces not filled)	50	50	50	50	50	77	102
Hollow clay tile [5] (column spaces filled)[2]	50[6]	50[6]	50[6]	50[6]	(7)	(7)	(7)
Hollow clay tile (column spaces not filled)	50[6]	50[6]	50[6]	—	—	—	—

Notes to Table 2.6.1.A.:

(1) Applies to cast-in-place concrete reinforced with 5.21 mm diam wire wrapped around column spirally 200 mm o.c., or 1.57 mm diam wire mesh with 100 mm by 100 mm openings.

(2) The space between the protective covering and the web or flange of the column shall be filled with concrete, cement mortar or a mixture of cement mortar and broken bricks.

(3) Concrete masonry shall be reinforced with 5.21 mm diam wire or wire mesh with 1.19 mm diam wire and 10 mm by 10 mm openings, laid in every second course.

(4) Brick cover 77 mm thick or less shall be reinforced with 2.34 mm diam wire or 1.19 mm diam wire mesh with 10 mm by 10 mm openings, laid in every second course.

(5) Hollow clay tiles and masonry mortar shall be reinforced with 1.19 mm diam wire mesh with 10 mm by 10 mm openings, laid in every horizontal joint and lapped at corners.

(6) Hollow clay tiles shall conform to CSA A82.5-M "Structural Clay Non-Load-Bearing Tile".

(7) 50 mm nominal hollow clay tile, reinforced with 1.19 mm diam wire mesh with 10 mm by 10 mm openings laid in every horizontal joint and covered with 19 mm gypsum-sand plaster and with limestone concrete fill in column spaces, has a 4 h fire-resistance rating.

Table 2.6.1.B.
Minimum Thickness of Plaster Protection to Steel Columns, mm

Description	Fire-Resistance Rating [1]						
	30 min	45 min	1 h	1.5 h	2 h	3 h	4 h
Gypsum-sand plaster on 9.5 mm gypsum lath [3]	13	13	13	20	—	—	—
Gypsum-perlite or vermiculite plaster on 9.5 mm gypsum lath [3]	13	13	13	20	25	—	—
Gypsum perlite or vermiculite plaster on 12.7 mm gypsum lath [3]	13	13	13	20	25	32	50
Gypsum perlite or vermiculite plaster on double 12.7 mm gypsum lath [3]	13	13	13	20	25	25	32
Portland cement-sand plaster on metal lath [4][5]	25	25	25	—	—	—	—

Notes to Table 2.6.1.B.:

(1) Fire-resistance ratings of 30 min and 45 min apply to columns whose M/D ratio is 30 or greater. Fire-resistance ratings greater than 45 min apply to columns whose M/D ratio is greater than 60. Where the M/D ratio is between 30 and 60 and the required fire-resistance rating is greater than 45 min, the total thickness of protection specified in the Table shall be increased by 50%. (To determine M/D, refer to Subsection 2.6.4.)

(2) Where the thickness of plaster over gypsum lath is 25 mm or more, wire mesh with 1.57 mm diam wire and openings not exceeding 50 mm by 50 mm shall be placed midway in the plaster.

(3) Lath held in place by 1.19 mm diam wire wrapped around lath 450 mm o.c.

(4) Expanded metal lath 1.36 kg/m² fastened to 9.5 mm by 19 mm steel channels held in vertical position around column by 1.19 mm diam wire ties.

(5) For mixture of Portland cement-sand plaster, see Sentence 1.7.2.(2).

Table 2.6.1.C.
Minimum Thickness of Gypsum-Sand Plaster on Metal Lath Protection to Steel Columns, mm

M/D[1]	Fire-Resistance Rating					
	30 min	45 min	1 h	1.5 h	2 h	3 h
30 to 60	16	16	32	—	—	—
over 60 to 90	16	16	16	32	—	—
over 90 to 120	16	16	16	25	39	—
over 120 to 180	16	16	16	16	25	—
over 180	16	16	16	16	25	39

Notes to Table 2.6.1.C.:

(1) To determine the M/D ratio, refer to Subsection 2.6.4.

Table 2.6.1.D.
Minimum Thickness of Gypsum-Perlite or Gypsum-Vermiculite Plaster on Metal Lath Protection to Steel Columns, mm

M/D[1]	Fire-Resistance Rating						
	30 min	45 min	1 h	1.5 h	2 h	3 h	4 h
30 to 60	16	16	20	32	35	—	—
over 60 to 90	16	16	16	20	26	35	45
over 90 to 120	16	16	16	16	26	35	45
over 120 to 180	16	16	16	16	20	32	35
over 180	16	16	16	16	16	26	35

Notes to Table 2.6.1.D.:

(1) To determine the M/D ratio, refer to Subsection 2.6.4.

Table 2.6.1.E.
Steel Columns with Sheet-Steel Membrane and Insulation as Shown in Figures 2.6.1.A. and 2.6.1.B.

Type of Protection	Steel Thickness[1] mm	Fastening[2]	Insulation	Fire-Resistance Rating
See Figure 2.6.1.(a)	0.51	No. 8 sheet-metal screws 9.5 mm long, 200 mm o.c.	50 mm mineral wool batts	45 min
See Figure 2.6.1.(b)	0.64	Self-threading screws or No. 8 sheet-metal screws, 600 mm o.c.	2 layers 12.7 mm gypsum wallboard	1.5 h
See Figure 2.6.1.(a)	0.64	No. 8 sheet-metal screws, 9.5 mm long, 200 mm o.c.	75 mm mineral wool batts,[3] 12.7 mm gypsum wallboard	2 h
See Figure 2.6.1.(b)	0.76	Crimped joint or No. 8 sheet- metal screws, 300 mm o.c.	2 layers 15.9 mm gypsum wallboard	2 h

Notes to Table 2.6.1.E.:

(1) Minimum thickness, galvanized or wiped-zinc-coated sheet-steel.

(2) Sheet-steel shall be securely fastened to the floor and superstructure, or where sheet-steel cover does not extend floor to floor, fire stopping shall be provided at the level where sheet-steel protection ends. In the latter case, an alternate type of fire protection shall be applied between the fire stopping and the superstructure.

(3) Conforming to CAN/ULC-S702, "Mineral Fibre Thermal Insulation for Buildings", Type 1A, minimum density 30 kg/m^3, column section and batts wrapped with 25 mm mesh chicken wire.

Table 2.6.1.F.
Minimum M/D Ratio for Steel Columns Covered with Type X Gypsum Wallboard Protection(1)

Minimum Thickness of Type X Gypsum Wallboard Protection(2), mm	Fire-Resistance Rating			
	1 h	1.5 h	2 h	3 h
12.7	75	—	—	—
15.9	55	—	—	—
25.4	35	60	—	—
28.6	35	50	—	—
31.8	35	40	75	—
38.1	35	35	55	—
41.3	35	35	45	—
44.5	35	35	35	—
47.6	35	35	35	—
50.8	35	35	35	75
63.5	35	35	35	45

Notes to Table 2.6.1.F.:

(1) To determine the M/D ratio, refer to Subsection 2.6.4.

(2) See Subsection 2.6.5.

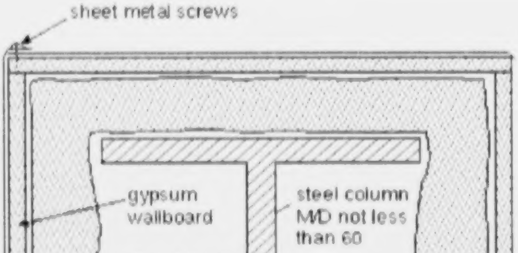

sheet metal screws
gypsum wallboard
sheet steel cover
mineral wool insulation
steel column M/D not less than 60
wire mesh

Figure 2.6.1.A.
Column Protected by Sheet-steel Membrane and Mineral-wool Insulation

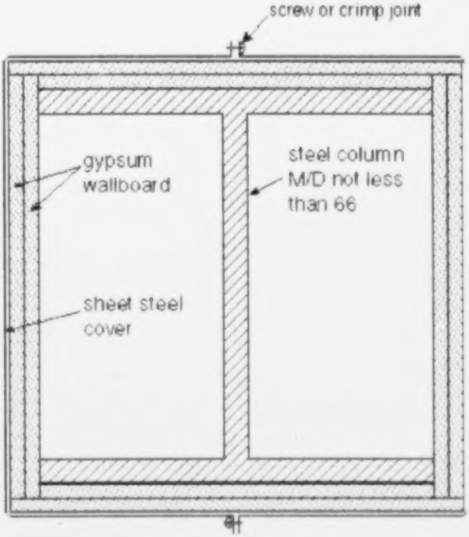


Figure 2.6.1.B.
Column Protected by Sheet-steel Membrane and Gypsum Wallboard

2.6.2. Hollow Unit Masonry Columns

(1) For hollow-unit masonry column protection, the thickness shown in Tables 2.6.1.A. to 2.6.1.D. is the equivalent thickness as described in Section 1.6.

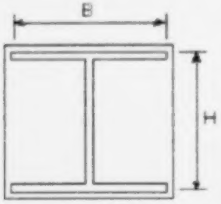
2.6.3. Effect of Plaster

(1) The effect on fire-resistance ratings of the addition of plaster to masonry and monolithic concrete column protection is described in Section 1.7.

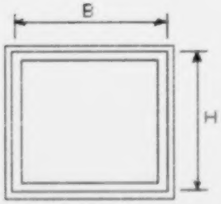
2.6.4. Determination of M/D Ratio

(1) The ratio M/D to which reference is made in Tables 2.6.1.B., 2.6.1.C., 2.6.1.D. and 2.6.1.F. shall be found by dividing "M," the mass of the column in kilograms per metre by "D," the heated perimeter of the steel column section in metres.

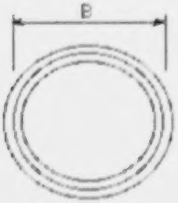
(2) The heated perimeter "D" of steel columns, shown as the dashed line in Figure 2.6.4.A., shall be equal to 2 (B+H) in Examples (1) and (2), and 3.14B in Example (3). In Figure 2.6.4.B., the heated perimeter "D" shall be equal to 2 (B+H).



example (1)

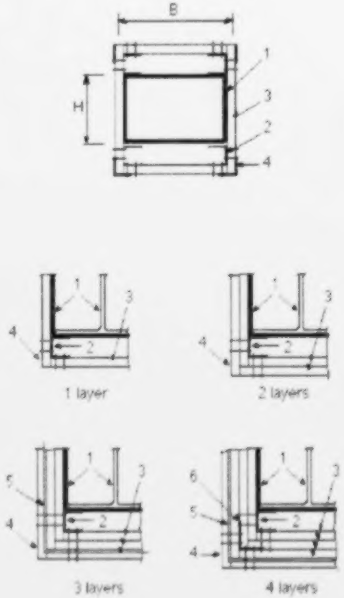


example (2)



example (3)

Figure 2.6.4.A.
Example (1), Standard or Wide-flange Beam,
Example (2), Hollow Structural Section (rectangular or square),
Example (3), Hollow Structural Section (Round)



1 structural member
2 steel studs
3 gypsum wallboard (type x)
4 steel corner bead
5 tie wire
6 sheet metal angle

Figure 2.6.4.B.
Columns Protected by Type X Gypsum Wallboard
Without Sheet-steel Membrane

2.6.5. Attachment of Gypsum Wallboard

(1) Where Type X gypsum wallboard is used to protect a steel column without an outside sheet-steel membrane, the method of wallboard attachment to the column shall be as shown in Figure 2.6.4.B. and shall meet the construction details described in Sentences (2) to (7).

(2) The Type X gypsum wallboard shall be applied vertically without horizontal joints.

(3) The first layer of wallboard shall be attached to steel studs with screws spaced not more than 600 mm o.c. and other layers of wallboard shall be attached to steel studs and steel corner beads with screws spaced at a maximum of 300 mm o.c. Where a single layer of wallboard is used, attachment screws shall be spaced not more than 300 mm o.c.

(4) Steel tie wires spaced at a maximum of 600 mm o.c. shall be used to secure the second last layer of wallboard in 3- and 4-layer systems.

(5) Studs shall be fabricated of galvanized steel not less than 0.53 mm thick and not less than 41.3 mm wide, with legs not less than 33.3 mm long and shall be 12.7 mm less than the assembly height.

(6) Corner beads shall
(a) be fabricated of galvanized steel that is not less than 0.41 mm thick,
(b) have legs not less than 31 mm long,
(c) be attached to the wallboard or stud with 25.4 mm screws spaced not more than 300 mm o.c., and
(d) have the attaching fasteners penetrate either another corner bead in multiple layer assemblies or the steel stud member.

(7) In a 4-layer system, metal angles shall be fabricated of galvanized steel and shall be not less than 0.46 mm thick with legs not less than 51 mm long.

2.6.6. Concrete Filled Hollow Steel Columns

(1) A fire-resistance rating, R, is permitted to be assigned to concentrically loaded hollow steel columns that are filled with plain concrete, steel-fibre reinforced concrete or bar-reinforced concrete, that are fabricated and erected within the tolerances stipulated in CAN/CSA-S16, "Limit States Design of Steel Structures", and that comply with Sentences (2) and (3), provided:

$$C \le C_{max}$$

where

C = axial compressive force due to dead and live loads without load factors, kN,

$$C_{max} = \left(\frac{a\,(f'_c + 20)\,D^{2.5}}{R\,(KL - 1000)} \right)^2$$

but shall not exceed
$1.0\,C'_r$, for plain concrete filling (PC),
$1.1\,C'_r$, for steel-fibre reinforced concrete filling (FC), and
$1.7\,C'_r$, for bar-reinforced concrete filling (RC),

where
C'_r = factored compressive resistance of the concrete core in accordance with CAN/CSA-S16, "Limit States Design of Steel Structures",

where
a = constant obtained from Table 2.6.6.A.,
f'_c = specified compressive strength of concrete in accordance with CSA A23.3, "Design of Concrete Structures", MPa,
D = outside diameter of a round column or outside width of a square column, mm,
R = specified fire-resistance rating, min, and
KL = effective length of column as defined in CAN/CSA-S16, "Limit States Design of Steel Structures", mm, subject to the validity limits stated in Table 2.6.6.B.

(2) A pair of steam vent holes shall be provided at each end of the hollow steel column and at each intermediate floor level, and the holes shall be

(a) not less than 13 mm in diameter,
(b) located on opposite faces, 150 mm above or below a base plate, cap plate or concrete slab,
(c) orientated so that adjacent pairs are perpendicular, and
(d) not obstructed by other building elements.

(3) Load application and reaction shall be through end bearing in accordance with CAN/CSA-S16, "Limit States Design of Steel Structures".

Table 2.6.6.A.
Values of Constant "a"

Filling Type	Concrete Type[1]	Steel Reinforcement	Circular Columns	Square Columns
PC	S	n/a	0.070	0.060
FC	S	2%	0.075	0.065
RC	S	1.5%-3%	0.080	0.070
RC	S	3%-5%	0.085	0.075
PC	N	n/a	0.080	0.070
FC	N	2%	0.085	0.075
RC	N	1.5%-3%	0.090	0.080
RC	N	3%-5%	0.095	0.085

Notes to Table 2.6.6.A.:
(1) See Subsection 1.4, Types of Concrete

Table 2.6.6.B.
Vality Limits

Parameter	Type of Concrete Filling		
	PC	FC	RC
f'_c (MPa)	20 to 40	20 to 55	20 to 55
D (round) (mm)	140 to 410	120 to 410	165 to 410
D (square) (mm)	140 to 305	102 to 305	175 to 305
Reinforcement (%)	n/a	2% of the concrete mix by mass	1.5% to 5% of cross-sectional area[1]
Concrete Cover (mm)	n/a	n/a	25
R (min)	120	180	180
KL (mm)	2 000 to 4 000	2 000 to 4 500	2 000 to 4 500
Class[2]	1, 2 or 3	1, 2 or 3	1, 2 or 3

Notes to Table 2.6.6.B.:
(1) Limits on size, number and spacing of bars and ties in accordance with CSA A23.3, "Design of Concrete Structures"
(2) Classification of sections in accordance with CAN/CSA-S16, "Limit States Design of Steel Structures"

2.7. Individually Protected Steel Beams

2.7.1. Minimum Thickness of Protective Covering

(1) The minimum thickness of protective covering on steel beams exposed to fire on 3 sides for fire-resistance ratings from 30 min to 4 h is shown in Table 2.7.1.

Table 2.7.1.
Minimum Thickness of Cover to Individual Protected Steel Beams, mm[1]

Description of Cover	Fire-Resistance Rating						
	30 min	45 min	1 h	1.5	2h	3 h	4 h
Type S concrete[2] (beam spaces filled solid)	25	25	25	25	32	50	64
Type N or L concrete[2] (beam spaces filled solid)	25	25	25	25	25	39	50
Gypsum-sand plaster on 9.5 mm gypsum lath[3]	13	13	13	20	—	—	—
Gypsum-perlite or vermiculite plaster on 9.5 mm gypsum lath[3]	13	13	13	13	25	—	—
Gypsum-perlite or gypsum-vermiculite on 12.7 mm gypsum lath[3]	13	13	13	20	25	39	50
Gypsum-perlite or vermiculite plaster on double 12.7 mm gypsum lath[3]	13	13	13	20	25	25	39
Portland cement-sand on metal lath[4]	23	23	23	—	—	—	—
Gypsum-sand on metal lath[4] (plaster in contact with lower flange)	16	20	25	39	—	—	—
Gypsum-sand on metal lath with air gap between plaster and lower flange[4]	16	16	16	25	25	—	—
Gypsum-perlite or gypsum-vermiculite on metal lath[4]	16	16	16	23	23	35	48[5]

Notes to Table 2.7.1.:

(1) Where the thickness of plaster finish applied over gypsum lath is 26 mm or more, the plaster shall be reinforced with wire mesh with 1.57 mm diam wire and 50 mm by 50 mm openings placed midway in the plaster.

(2) Applies to cast-in-place concrete reinforced by 5.21 mm diam wire spaced 200 mm o.c. or 1.57 mm diam wire mesh with 100 mm by 100 mm openings.

(3) Lath held in place by 1.18 mm diam wire wrapped around the gypsum lath 450 mm o.c.

(4) Expanded metal lath 1.63 kg/m² fastened to 9.5 mm by 19 mm steel channels held in position by 1.19 mm diam wire.

(5) Plaster finish shall be reinforced with wire mesh with 1.57 mm diam wire and 50 mm by 50 mm openings placed midway in the plaster.

2.7.2. Types of Concrete

(1) Concrete is referred to as Type S, N or L, depending on the nature of the aggregate used. This is described in Subsection 1.4.1.

2.7.3. Effect of Plaster

(1) The effect on fire-resistance ratings of the addition of plaster finish to concrete or masonry beam protection is described in Subsection 1.7.1.

2.7.4. Exceptions

(1) The fire resistance of protected steel beams depends on the means used to hold the protection in place. Because of the importance of this factor, no rating has been assigned in Table 2.7.1. to masonry units used as protective cover to steel beams. These ratings, however, may be determined on the basis of comparison with column protection at the discretion of the authority having jurisdiction, if satisfactory means of fastening are provided.

2.7.5. Beam Protected by a Membrane

(1) A steel beam or steel joist assembly that is entirely above a horizontal ceiling membrane will be protected from fire below the membrane and will resist structural collapse for a period equal to the fire-resistance rating determined in conformance with Section 2.3. The support for this membrane shall be equivalent to that described in Section 2.3. The rating on this basis shall not exceed 1.5 h.

2.8. Reinforced Concrete Columns

2.8.1. Minimum Dimensions

(1) Minimum dimensions for reinforced concrete columns and minimum concrete cover for vertical steel reinforcement are obtained from Subsections 2.8.2. to 2.8.5., taking into account the type of concrete, the effective length of the column and the area of the vertical reinforcement.

2.8.2. Method

(1) The minimum dimension, t, in millimetres, of a rectangular reinforced concrete column shall be equal to

(a) 75 f (R + 1) for all Types L and L40S concrete,

(b) 80 f (R + 1) for Type S concrete when the design condition of the concrete column is defined in the second and fourth columns of Table 2.8.2.,

(c) 80 f (R + 0.75) for Type N concrete when the design condition of the concrete column is defined in the second and fourth columns of Table 2.8.2., and

(d) 100 f (R + 1) for Types S and N concrete when the design condition of the concrete column is defined in the third column of Table 2.8.2.

where

f = the value shown in Table 2.8.2.,
R = the required fire-resistance rating in hours,
k = the effective length factor obtained from CSA A23.3, "Design of Concrete Structures",
h = the unsupported length of the column in metres, and
p = the area of vertical reinforcement in the column as a percentage of the column area.

Table 2.8.2.
Values of Factor "f"(1)

Overdesign Factor(4)	Values of Factor f to be Used in Applying 2.8.2.(2)(3)		
	Where kh is not more than 3.7 m	Where kh is more than 3.7 m but not more than 7.3 m(2)(3)	
		t is not more than 300 mm p is not more than 3%	All other cases
1.00	1.00	1.20	1.00
1.25	0.90	1.10	0.90
1.50	0.83	1.00	0.83

Notes to Table 2.8.2.:

(1) For conditions that do not fall within the limits described in Table 2.8.2., further information may be obtained from Reference (7) in Section 6.1.

(2) Where the factor 'f' results in a 't' greater than 300 mm, the appropriate factor 'f' for all other cases shall be applicable.

(3) Where 'p' is equal to or less than 3% and the factor 'f' results in a 't' less than 300 mm, the minimum thickness shall be 300 mm.

(4) Overdesign factor is the ratio of the calculated load carrying capacity of the column to the column strength required to carry the specified loads determined in conformance with CSA A23.3, "Design of Concrete Structures".

(2) The diameter of a round column shall be not less than 1.2 times the value "t" determined in Sentence (1) for a rectangular column.

2.8.3. Minimum Thickness of Concrete Cover

(1) Where the required fire-resistance rating of a concrete column is 3 h or less, the minimum thickness in millimetres of concrete cover over vertical steel reinforcement shall be equal to 25 times the number of hours of fire resistance required or 50 mm, whichever is less.

(2) Where the required fire-resistance rating of a concrete column is greater than 3 h, the minimum thickness in millimetres of concrete cover over vertical steel reinforcement shall be equal to 50 plus 12.5 times the required number of hours of fire resistance in excess of 3 h.

(3) Where the concrete cover over vertical steel required in Sentence (2) exceeds 62.5 mm, wire mesh reinforcement with 1.57 mm diameter wire and 100 mm openings shall be incorporated midway in the concrete cover to retain the concrete in position.

2.8.4. Minimum Requirements

(1) The structural design standards may require minimum column dimensions or concrete cover over vertical steel reinforcement differing from those obtained in Sentences 2.8.2.(1) and (2). Where a difference occurs, the greater dimension shall govern.

2.8.5. Addition of Plaster

(1) The addition of plaster finish to the concrete column may be taken into account in determining the cover over vertical steel reinforcement by applying the multiplying factors described in Section 1.7. The addition of plaster shall not, however, justify any decrease in the minimum column sizes shown.

2.8.6. Built-in Columns

(1) The fire-resistance rating of a reinforced concrete column that is built into a masonry or concrete wall so that not more than one face may be exposed to the possibility of fire at one time may be determined on the basis of cover to vertical reinforcing steel alone. In order to meet this condition, the wall shall conform to Section 2.1. for the fire-resistance rating required.

2.9. Reinforced Concrete Beams

2.9.1. Minimum Cover Thickness

(1) The minimum thickness of cover over principal steel reinforcement in reinforced concrete beams is shown in Table 2.9.1. for fire-resistance ratings from 30 min to 4 h where the width of the beam or joist is at least 100 mm.

Table 2.9.1.
Minimum Cover to Principal Steel Reinforcement in Reinforced Concrete Beams, mm

Type of Concrete	Fire-Resistance Rating						
	30 min	45 min	1 h	1.5 h	2 h	3 h	4 h
Type S, N or L	20	20	20	25	25	39	50

2.9.2. Maximum Rating

(1) No rating over 2 h may be assigned on the basis of Table 2.9.1. to a beam or joist where the average width of the part that projects below the slab is less than 140 mm, and no rating over 3 h may be assigned where the average width of the part that projects below the slab is less than 165 mm.

2.9.3. Beam Integrated in Floor or Roof Slab

(1) For the purposes of these ratings, a beam may be either independent of or integral with a floor or roof slab assembly.

2.9.4. Minimum Thickness

(1) Where the upper extension or top flange of a joist or T-beam in a floor assembly contributes wholly or partly to the thickness of the slab above, the total thickness at any point shall be not less than the minimum thickness described in Table 2.2.1.A. for the fire-resistance rating required.

2.9.5. Effect of Plaster

(1) The addition of plaster finish to a reinforced concrete beam may be taken into account in determining the cover over principal reinforcing steel by applying the multiplying factors described in Section 1.7.

2.10. Prestressed Concrete Beams

2.10.1. Minimum Cross-Sectional Area and Thickness of Cover

(1) The minimum cross-sectional area and thickness of concrete cover over steel tendons in prestressed concrete beams for fire-resistance ratings from 30 min to 4 h are shown in Table 2.10.1.

Table 2.10.1.
Minimum Thickness of Concrete Cover over Steel Tendons in Prestressed Concrete Beams, mm(1)

Type of Concrete	Area of Beam, cm^2	Fire-Resistance Rating						
		30 min	45 min	1 h	1.5 h	2 h	3 h	4 h
Type S or N	260 to 970	25	39	50	64	—	—	—
	Over 970 to 1 940	25	26	39	45	64	—	—
	Over 1 940	25	26	39	39	50	77	102
Type L	Over 970	25	25	25	39	50	77	102

Notes to Table 2.10.1.:

(1) Where the thickness of concrete cover over the tendons exceeds 64 mm, a wire mesh reinforcement with 1.57 mm diam wire and 100 mm by 100 mm openings, shall be incorporated in the beams to retain the concrete in position around the tendons. The mesh reinforcement shall be located midway in the cover.

2.10.2. Minimum Cover Thickness

(1) The cover for an individual tendon shall be the minimum thickness of concrete between the surface of the tendon and the fire-exposed surface of the beam, except that for ungrouted ducts the assumed cover thickness shall be the minimum thickness of concrete between the surface of the duct and the surface of the beam. For beams in which several tendons are used, the cover is assumed to be the average of the minimum cover of the individual tendons. The cover for any individual tendon shall be not less than half the value given in Table 2.10.1. nor less than 25 mm.

2.10.3. Applicability of Ratings

(1) The ratings in Table 2.10.1. apply to a beam that is either independent of or integral with a floor or roof slab assembly. Minimum thickness of slab and minimum cover to steel tendons in prestressed concrete slabs are contained in Section 2.2.

2.10.4. Effect of Plaster

(1) The addition of plaster finish to a prestressed concrete beam may be taken into account in determining the cover over steel tendons by applying the multiplying factors described in Section 1.7.

2.10.5. Minimum Cover

(1) Except as provided in Sentence (2), in unbonded post- tensioned prestressed concrete beams, the concrete cover to the tendon at the anchor shall be not less than 15 mm greater than the minimum required away from the anchor. The concrete cover to the anchorage bearing plate and to the end of the tendon, if it projects beyond the bearing plate, shall be not less than 25 mm.

(2) The requirements in Sentence (1) do not apply to those portions of beams not likely to be exposed to fire (such as the ends and the tops of flanges of beams immediately below slabs).

2.11. Glued-Laminated Timber Beams and Columns

2.11.1. Applicability of Information

(1) The information in Section 2.11. applies to glued-laminated timber beams and columns required to have fire-resistance ratings greater than those afforded under the provisions of Article 3.1.4.5. of Division B.

2.11.2. Method of Calculation

(1) The fire-resistance rating of glued-laminated timber beams and columns in minutes shall be equal to
(a) $0.1\,fB\,[4 - 2(B/D)]$ for beams which may be exposed to fire on 4 sides,
(b) $0.1\,fB\,[4 - (B/D)]$ for beams which may be exposed to fire on 3 sides,
(c) $0.1\,fB\,[3 - (B/D)]$ for columns which may be exposed to fire on 4 sides, and
(d) $0.1\,fB\,[3 - (B/2D)]$ for columns which may be exposed to fire on 3 sides.

where
f = the load factor shown in Figure 2.11.2.A.,
B = the full dimension of the smaller side of a beam or column in millimetres before exposure to fire (see Figure 2.11.2.B.),
D = the full dimension of the larger side of a beam or column in millimetres before exposure to fire (see Figure 2.11.2.B.),
k = the effective length factor obtained from CAN/CSA-O86, "Engineering Design in Wood",
L = the unsupported length of a column in millimetres.

(2) The factored resistance of a beam or column shall be determined by using the specified strengths in CAN/CSA-O86.1, "Engineering Design in Wood".

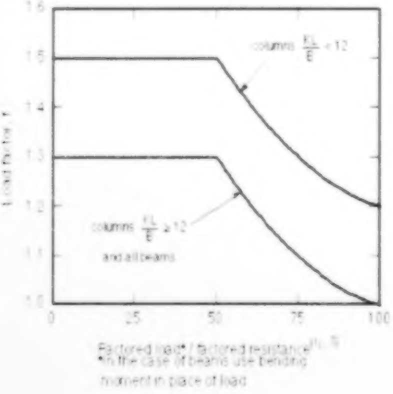


Figure 2.11.2.A.
Factors to Compensate for Partially Loaded Columns and Beams

Note to Figure 2.11.2.A.:

(1) See Sentence 2.11.2.(2).

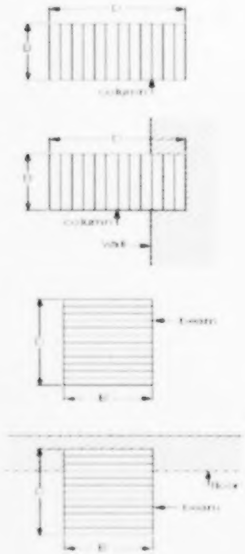

D
B
column
D
B
column
wall
beam
D
B
floor
beam
D
B

Figure 2.11.2.B.
Full Dimensions of Glued-laminated Beams and Columns

Section 3 Flame-Spread Ratings and Smoke Developed Classifications

3.1. Interior Finish Materials

3.1.1. Scope of Information

(1) Tables 3.1.1.A. and 3.1.1.B. show flame-spread ratings and smoke developed classifications for combinations of some common interior finish materials. The values are based on all the evidence available at present. Many materials have not been included because of lack of test evidence or because of inability to classify or describe the material in generic terms for the purpose of assigning ratings.

3.1.2. Ratings

(1) The ratings shown in Tables 3.1.1.A. and 3.1.1.B. are arranged in groups corresponding to the provisions of this Code. The ratings apply to materials falling within the general categories indicated.

3.1.3. Table Entries

(1) In Tables 3.1.1.A. and 3.1.1.B., the first number of each entry relates to flame spread and the second number to smoke developed limit. For example:

25/50 represents a flame-spread rating of 0 to 25 and a smoke developed classification of 0 to 50.

150/300 represents a flame-spread rating of 75 to 150 and a smoke developed classification of 100 to 300.

X/X applied to walls and ceilings means a flame-spread rating over 150 and a smoke developed classification over 300.

3.1.4. Effect of Surface Coatings

(1) Thin surface coatings can modify flame-spread characteristics either upward or downward. Table 3.1.1.A. includes a number of thin coatings that increase the flame-spread rating of the base material, so that these may be considered where more precise control over flame spread hazard is desired.

3.1.5. Proprietary Materials

(1) Information on flame-spread rating of proprietary materials and fire-retardant treatments that cannot be described in sufficient detail to ensure reproducibility is available through the listing and labelling services of Underwriters' Laboratories of Canada, Warnock Hersey or other recognized testing laboratory.

(2) A summary of flame spread test results published prior to 1965 has been prepared by the Institute for Research in Construction of the National Research Council of Canada (see Item (1) in Section 6.1. Fire Test Reports).

Table 3.1.1.A.
Assigned Flame-Spread Ratings and Smoke Developed Classifications for Combinations of Wall and Ceiling Finish Materials and Surface Coatings(1)

Materials	Applicable Material Standard	Minimum Thickness, mm	Surface Coating	
			Unfinished	Paint or Varnish not more than 1.3 mm Thick, Cellulosic Wallpaper not more than One Layer(2)(3)
Asbestos cement board	CAN/CGSB-34.16-M	None	0/0	25/50
Brick, concrete, tile	None	None		
Steel, copper, aluminum	None	0.33		
Gypsum plaster	CSA A82.22-M	None		
Gypsum wallboard	CSA A82.27-M ASTM C36 / C36M ASTM C442 / C442M ASTM C588 / C588M ASTM C630 / C630M ASTM C931 / C931M	9.5	25/50	25/50
Lumber	None	16	150/300	150/300
Douglas Fir plywood(4)	CSA O121-M	11	150/100	150/300
Poplar plywood(4)	CSA O153-M			
Plywood with Spruce face veneer(4)	CSA O151-M			
Douglas Fir plywood(4)	CSA O121-M	6	150/100	150/100
Fiberboard low density	CAN/ULC-S706	11	X/100	150/100
Hardboard	CAN/CGSB-11.3			
Type 1		96	150/X	(5)
Standard			150/300	150/300
Particleboard	ANSI A208.1	12.7	150/300	(5)
Waferboard	CSA O437.0	—	(5)	(5)

Notes to Table 3.1.1.A.:

(1) See Sentence 1.1.1.(5) for standards used to assign flame-spread ratings and smoke developed classifications.

(2) Flame-spread ratings and smoke developed classifications for paints and varnish are not applicable to shellac and lacquer.

(3) Flame-spread ratings and smoke developed classifications for paints apply only to alkyd and latex paints.

(4) The flame-spread ratings and smoke developed classifications shown are for those plywoods without a cellulose resin overlay.

(5) Insufficient test information available.

Table 3.1.1.B.
Flame-Spread Ratings and Smoke Developed Classifications for Combinations of Common Floor Finish Materials and Surface Coatings(1)

Materials	Applicable Standard	FSR/SDC(2)
Hardwood or softwood flooring either unfinished or finished with a spar or urethane varnish coating	None	300/300
Vinyl-asbestos flooring not more than 4.8 mm thick applied over plywood or lumber subfloor or direct to concrete	CSA A126.1-M	300/300
Wool carpet (woven), pile weight not less than 1120 g/m^2, applied with or without felt underlay(3)	CAN/CGSB-4.129	300/300
Nylon carpet, pile weight not less than 610 g/m^2 and not more than 800 g/m^2, applied with or without felt underlay(3)	CAN/CGSB-4.129	300/500
Nylon carpet, pile weight not less than 610 g/m^2 and not more than 1355 g/m^2, glued down to concrete	CAN/CGSB-4.129	300/500
Wool/nylon blend carpet (woven) with not more than 20% nylon and pile weight not less than 112 g/m^2	CAN/CGSB-4.129	300/500
Nylon/wool blend carpet (woven) with not more than 50% wool, pile weight not less than 610 g/m^2 and not more than 800g/m^2	CAN/CGSB-4.129	300/500
Polypropylene carpet, pile weight not less than 500 g/m^2 and not more than 1200 g/m^2, glued down to concrete	CAN/CGSB-4.129	300/500

Notes to Table 3.1.1.B.:

(1) Tested on the floor of the tunnel in conformance with provisions of CAN/ULC-S102.2, "Test for Surface Burning Characteristics of Flooring, Floor Covering, and Miscellaneous Materials and Assemblies."

(2) Flame-Spread Rating/Smoke Developed Classification

(3) Type 1 or 2 underlay as described in CGSB 4-GP-36M, "Carpet Underlay, Fiber Type"

3.1.6. Limitations and Conditions

(1) The propagation of flame along a surface in the standard test involves some finite depth of the material or materials behind the surface, and this involvement extends to the depth to which temperature variations are to be found during the course of the test; for many commonly used lining materials, such as wood, the depth involved is about 25 mm.

(2) For all the combustible materials described in Table 3.1.1.A., a minimum dimension is shown, and this represents the thickness of the test samples on which the rating has been based; when used in greater thicknesses than that shown, these materials may have a slightly lower flame-spread rating, and thinner specimens may have higher flame-spread ratings.

(3) No rating has been included for foamed plastic materials because it is not possible at this time to identify these products with sufficient accuracy on a generic basis. Materials of this type which melt when exposed to the test flame generally show an increase in flame-spread rating as the thickness of the test specimen increases.

3.1.7. Referenced Standards

In Tables 3.1.1.A. and 3.1.1.B., the standards applicable to the materials described are noted because the ratings depend on conformance with these specifications.

Section 4 Noncombustibility

4.1. Test Method

4.1.1. Determination of Noncombustibility

(1) Noncombustibility is required of certain components of buildings by the provisions of this Code, which specifies noncombustibility by reference to CAN4-S114-M, " Test for Determination of Non-Combustibility in Building Materials".

(2) The test to which reference is made in Sentence (1) is severe, and it may be assumed that any building material containing even a small proportion of combustibles will itself be classified as combustible. The specimen, 38 mm by 51 mm, is exposed to a temperature of 750°C in a small furnace. The essential criteria for noncombustibility are that the specimen does not flame or contribute to temperature rise.

4.2. Materials Classified as Combustible

4.2.1. Combustible Materials

(1) Most materials from animal or vegetable sources will be classed as combustible by CAN4-S114-M, "Test for Determination of Non-Combustibility in Building Materials", and wood, wood fibreboard, paper, felt made from animal or vegetable fibres, cork, plastics, asphalt and pitch would therefore be classed as combustible.

4.2.2. Composite Materials

(1) Materials that consist of combustible and noncombustible elements in combination will in many cases also be classed as combustible, unless the proportion of combustibles is very small. Some mineral wool insulations with combustible binder, cinder concrete, cement and wood chips and wood-fibred gypsum plaster would also be classed as combustible.

4.2.3. Effect of Chemical Additives

(1) The addition of a fire-retardant chemical is not sufficient to change a combustible product to a noncombustible product.

4.3. Materials Classified as Noncombustible

4.3.1. Typical Examples

(1) Noncombustible materials include brick, ceramic tile, concrete made from Portland cement with noncombustible aggregate, asbestos cement, plaster made from gypsum with noncombustible aggregate, metals commonly used in buildings, glass, granite, sandstone, slate, limestone and marble.

Section 5 Protection of Openings in Fire-Rated Assemblies

5.1. Scope

5.1.1. Installation Information

(1) The information in Section 5 specifies requirements for
(a) the installation of fire doors and fire dampers in gypsum-wallboard-protected stud wall assemblies, and
(b) fire stop flaps for installation in fire-rated membrane ceilings.

5.2. Installation of Fire Doors and Fire Dampers

5.2.1. References

(1) Fire doors and fire dampers in gypsum-wallboard- protected steel stud non-loadbearing walls required to have a fire-resistance rating shall be installed in conformance with Section 9.24. of Division B and the applicable requirements of NFPA 80, "Fire Doors and Fire Windows".

(2) Fire doors and fire dampers in gypsum-wallboard- protected wood stud walls required to have a fire-resistance rating shall be installed in conformance with Section 9.23. of Division B and the applicable requirements of NFPA 80, "Fire Doors and Fire Windows".

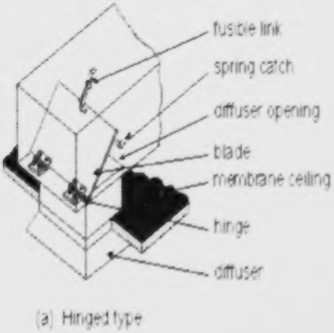
5.3. Fire Stop Flaps

5.3.1. Construction Requirements

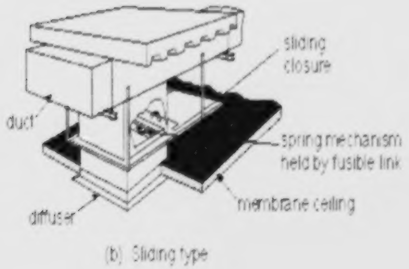
(1) Fire stop flaps shall be constructed of steel not less than 1.5 mm thick, covered on both sides with painted asbestos paper not less than 1.6 mm thick and equipped with pins and hinges of corrosion-resistant material (see Figure 5.3.1.).

5.3.2. Hold-open Devices

(1) Fire stop flaps shall be held open with fusible links conforming to ULC-S505, "Fusible Links for Fire Protection Service", or other heat-activated devices having a temperature rating approximately 30 C above the maximum temperature that would exist in the system either with the system in operation or shut down.


fusible link
spring catch
diffuser opening
blade
membrane ceiling
hinge
diffuser

(a) Hinged type


sliding closure
duct
spring mechanism held by fusible link
membrane ceiling
diffuser

(b) Sliding type

Figure 5.3.1.
Typical Fire Stop Flaps

Section 6 Background Information

6.1. Fire Test Reports

Summaries of available fire test information have been published by the Institute for Research in Construction (formerly the Division of Building Research) as follows:

(1) M. Galbreath, Flame Spread Performance of Common Building Materials. Technical Paper No. 170, Division of Building Research, National Research Council Canada, Ottawa, April 1964. NRCC 7820.

(2) M. Galbreath and W.W. Stanzak, Fire Endurance of Protected Steel Columns and Beams. Technical Paper No. 194, Division of Building Research, National Research Council Canada, Ottawa, April 1965. NRCC 8379.

(3) T.Z. Harmathy and W.W. Stanzak, Elevated- Temperature Tensile and Creep Properties of Some Structural and Prestressing Steels. American Society for Testing and Materials, Special Technical Publication 464, 1970, p. 186 (DBR Research Paper No. 424) NRCC 11163.

(4) T.Z. Harmathy. Thermal Performance of Concrete Masonry Walls in Fire. American Society for Testing and Materials, Special Technical Publication 464, 1970, p. 209 (DBR Research Paper No. 42(3) NRCC 11161.

(5) L.W. Allen. Fire Endurance of Selected Non-Loadbearing Concrete Masonry Walls. DBR Fire Study No. 25, Division of Building Research, National Research Council Canada, Ottawa, March 1970. NRCC 11275.

(6) A. Rose. Comparison of Flame Spread Ratings by Radiant Panel, Tunnel Furnace, and Pittsburgh-Corning Apparatus. DBR Fire Study No. 22, Division of Building Research, National Research Council Canada, Ottawa, June 1969. NRCC 10788.

(7) T.T. Lie and D.E. Allen. Calculation of the Fire Resistance of Reinforced Concrete Columns. DBR Technical Paper No. 378, Division of Building Research, National Research Council Canada, Ottawa, August 1972. NRCC 12797.

(8) W.W. Stanzak. Column Covers: A Practical Application of Sheet Steel as a Protective Membrane. DBR Fire Study No. 27, Division of Building Research, National Research Council Canada, Ottawa, February 1972. NRCC 12483.

(9) W.W. Stanzak. Sheet Steel as a Protective Membrane for Steel Beams and Columns. DBR Fire Study No. 23, Division of Building Research, National Research Council Canada, Ottawa, November 1969. NRCC 10865.

(10) W.W. Stanzak and T.T. Lie. Fire Tests on Protected Steel Columns with Different Cross-Sections. DBR Fire Study No. 30, Division of Building Research, National Research Council Canada, Ottawa, February 1973. NRCC 13072.

(11) G. Williams-Leir and L.W. Allen. Prediction of Fire Endurance of Concrete Masonry Walls. DBR Technical Paper No. 399, Division of Building Research, National Research Council Canada, Ottawa, November 1973. NRCC 13560.

(12) G. Williams-Leir. Prediction of Fire Endurance of Concrete Slabs. DBR Technical Paper No. 398, Division of Building Research, National Research Council Canada, Ottawa, November 1973. NRCC 13559.

(13) A. Rose. Flammability of Fibreboard Interior Finish Materials. Building Research Note No. 68, Division of Building Research, National Research Council Canada, Ottawa, October 1969.

(14) L.W. Allen. Effect of Sand Replacement on the Fire Endurance of Lightweight Aggregate Masonry Units. DBR Fire Study No. 26, Division of Building Research, National Research Council Canada, Ottawa, September 1971. NRCC 12112.

(15) L.W. Allen, W.W. Stanzak and M. Galbreath. Fire Endurance Tests on Unit Masonry Walls with Gypsum Wallboard. DBR Fire Study No. 32, Division of Building Research, National Research Council Canada, Ottawa, February 1974, NRCC 13901.

(16) W.W. Stanzak and T.T. Lie. Fire Resistance of Unprotected Steel Columns. Journal of Structural Division, Proc., Am. Soc. Civ. Eng., Vol. 99, No. ST5 Proc. Paper 9719, May 1973 (DBR Research Paper No. 577) NRCC 13589.

(17) T.T. Lie and T.Z. Harmathy. Fire Endurance of Concrete-Protected Steel Columns. A.C.I. Journal, January 1974, Title No. 71-4 (DBR Technical Paper No. 597) NRCC 13876.

(18) T.T. Lie. A Method for Assessing the Fire Resistance of Laminated Timber Beams and Columns. Can. J. Civ. Eng., Vol. 4, No. 2, June 1977 (DBR Technical Paper No. 718) NRCC 15946.

(19) T.T. Lie. Calculation of the Fire Resistance of Composite Concrete Floor and Roof Slabs. Fire Technology, Vol. 14, No. 1, February 1978 (DBR Technical Paper No. 77(2) NRCC 16658.

6.2. Obsolete Materials and Assemblies

Building materials, components and structural members and assemblies in buildings constructed before 1995 may have been assigned ratings based on earlier editions of The Supplement to the National Building Code of Canada or older reports of fire tests. To assist users in determining the ratings of these obsolete assemblies and structural members, the following list of reference documents has been prepared. Although some of these publications are out of print, reference copies are available at the Institute for Research in Construction, National Research Council of Canada, Ottawa, Ont., K1A 0R6.

(1) M. Galbreath, Fire Endurance of Unit Masonry Walls. Technical Paper No. 207, Division of Building Research, National Research Council Canada, Ottawa, October 1965. NRCC 8740

(2) M. Galbreath, Fire Endurance of Light Framed and Miscellaneous Assemblies. Technical Paper No. 222, Division of Building Research, National Research Council Canada, Ottawa, June 1966. NRCC 9085.

(3) M. Galbreath, Fire Endurance of Concrete Assemblies. Technical Paper No. 235, Division of Building Research, National Research Council Canada, Ottawa, November 1966. NRCC 9279

(4) Guideline on Fire Ratings of Archaic Materials and Assemblies. Rehabilitation Guideline #8, U.S. Department of Housing and Urban Development, Germantown, Maryland 20767, October

(5) T.Z. Harmathy, Fire Test of a Plank Wall Construction. Fire Study No. 2, Division of Building Research, National Research Council Canada, Ottawa, July 1960. NRCC 5760.

(6) T.Z. Harmathy, Fire Test of a Wood Partition. Fire Study No. 3, Division of Building Research, National Research Council Canada, Ottawa, October 1960. NRCC 5769.

6.3. Assessment of Archaic Assemblies

Information in this document applies to new construction. Please refer to early editions of the Supplement to the National Building Code of Canada for the assessment or evaluation of assemblies that do not conform to the information in this edition of the Building Code. As with other documents, this Code is revised according to the information presented to the standing committee responsible for its content, and with each update new material may be added and material that is not relevant may be deleted.

6.4. Development of the Component Additive Method

The component additive method was developed based upon the following observations and conclusions drawn from published as well as unpublished test information.

Study of the test data showed that structural failure preceded failure by other criteria (transmission of heat or hot gases) in most of the tests of loadbearing wood framed assemblies. The major contributor to fire resistance was the membrane on the fire-exposed side.

Fire tests of wood joist floors without protective ceilings resulted in structural failure between 8 and 10 min. Calculation of the time for wood joists to approach breaking stress, based upon the charring rate of natural woods, suggested a time of 10 min for structural failure. This time was subtracted from the fire-resistance test results of wood joist floors and the remainder considered to be the contribution of the membrane.

The figures obtained for the contribution of membranes were then applied to the test results for open web steel joist floors and wood and steel stud walls and values of 20 min for the contribution of wood stud framing and 10 min for steel framing were derived.

The fire-resistance rating has been limited to 1.5 h as this method of developing ratings for framed assemblies was new and untried. Although this is the subject of current review, no decision has been made to extend the ratings beyond 1.5 h.

(1) M. Galbreath, G. C. Gosselin, and R. B. Chauhan, Historical Guide to Chapter 2 of the Supplement to the National Building Code of Canada, Committee Paper FPR 1-3, Prepared for the Standing Committee on Fire Performance Ratings, May 1987.

Example showing fire-resistance rating of a typical membrane assembly, calculated using the component additive method.

1 hour Gypsum Board/Wood Stud Interior Partition

A 1 h fire-resistance rating is required for an interior wood framed partition, using 12.7 mm Type X gypsum wallboard.

(a) Since gypsum wallboard is used (Sentence 2.3.4.(2) and Table 2.3.4.A.) time assigned to 12.7 mm Type X gypsum wallboard membrane on the fire-exposed side of the partition = 25 min
(b) Time assigned to wood framing members at 400 mm o.c. (Sentence 2.3.4.(3) and Table 2.3.4.C.) = 20 min
(c) Time assigned to insulation, if the spaces between the studs are filled with preformed insulation of rock or slag fibres conforming to CAN/ULC-S702, "Mineral Fibre Thermal Insulation for Buildings", (Sentence 2.3.4.(4) and Table 2.3.4.D.) = 15 min
(d) Time assigned to the membrane on the non- fire-exposed side (Sentence 2.3.5.(1)) = 0 min
Fire-resistance rating = 25 + 20 + 15 = 60 min

Ministry of Municipal Affairs and Housing
Building and Development Branch

Ontario

2006 Building Code – Supplementary Standards

Supplementary Standard SB-3

Fire and Sound Resistance of Building Assemblies

August 15, 2006

Supplementary Standard
SB-3

COMMENCEMENT

Supplementary Standard SB-3 comes into force on the 31st day of December, 2006.

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SB-3 Fire and Sound Resistance of Building Assemblies

(This Standard is based in large measure on Appendix A of the National Building Code of Canada 2005)

The following Tables may be used to select building assemblies for compliance with Article 9.10.3.1. and Subsection 9.11.2. of Division B.

Tables 1 and 2 have been developed from information gathered from tests. While a large number of the assemblies listed were tested, the fire-resistance and acoustical ratings for others were assigned on the basis of extrapolation of information from tests of similar assemblies. Where there was enough confidence relative to the fire performance of an assembly, the fire-resistance ratings were assigned relative to the commonly used minimum ratings of 30 min, 45 min and 1 h, including a designation of "< 30 min" for assemblies that are known not to meet the minimum 30-minute rating. Where there was not enough comparative information on an assembly to assign to it a rating with confidence, its value in the Tables has been left blank (hyphen), indicating that its rating remains to be assessed through another means. Future work is planned to develop much of this additional information.

These Tables are provided only for the convenience of Code users and do not limit the number of assemblies permitted to those in the Tables. Assemblies not listed or not given a rating in these Tables are equally acceptable provided their fire and sound resistance can be demonstrated to meet the above-noted requirements either on the basis of tests referred to in Article 9.10.3.1. and Subsection 9.11.1. or by using the data in Supplementary Standard SB-2, Fire-Performance Ratings. It should be noted, however, that Tables 1 and 2 are not based on the same assumptions as those used in Supplementary Standard SB-2. Assemblies in Tables 1 and 2 are described through their generic descriptions and variants and include details given in the notes to the Tables. Assumptions for Supplementary Standard SB-2 include different construction details that must be followed rigorously for the calculated ratings to be expected. These are two different methods of choosing assemblies that meet required fire ratings.

Section 1 Fire and Sound Resistance of Walls

Table 1
Fire and Sound Resistance of Walls

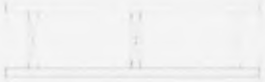
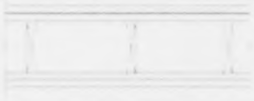
Type of Wall	Wall Number	Description	Fire-Resistance Rating[1]		Typical Sound Transmission Class[1][2][3] (STC)
			Loadbearing	Non-Loadbearing	
- Wood Studs - Single Row - Loadbearing or Non-Loadbearing	**W1**	- 38 mm x 89 mm wood studs spaced 400 mm or 600 mm o.c. - with or without absorptive material - 1 layer of gypsum board on each side			
	W1a	W1 with - 89 mm thick absorptive material[4] - 15.9 mm Type X gypsum board[5]	1 h	1 h	36
	W1b	W1 with - 89 mm thick absorptive material[4] - 12.7 mm Type X gypsum board[5]	45 min [1 h][6]	45 min [1 h][6]	34
	W1c	W1 with - 89 mm thick absorptive material[4] - 12.7 mm regular gypsum board[5][7]	30 min	30 min [45 min][6]	32
	W1d	W1 with - no absorptive material - 15.9 mm Type X gypsum board[5]	1 h	1 h	32
	W1e	W1 with - no absorptive material - 12.7 mm Type X gypsum board[5]	45 min	45 min	32
	W2	- 38 mm x 89 mm wood studs spaced 400 mm or 600 mm o.c. - with or without absorptive material - 2 layers of gypsum board on each side			
	W2a	W2 with - 89 mm thick absorptive material[4] - 15.9 mm Type X gypsum board[5]	1.5 h	2 h	38
	W2b	W2 with - 89 mm thick absorptive material[4] - 12.7 mm Type X gypsum board[5]	1 h	1.5 h	38
	W2c	W2 with - 89 mm thick absorptive material[4] - 12.7 mm regular gypsum board[5]	45 min	1 h	36
	W2d	W2 with - no absorptive material - 15.9 mm Type X gypsum board[5]	1.5 h	2 h	36
Column 1	2	3	4	5	6

Table 1 (Cont'd)
Fire and Sound Resistance of Walls

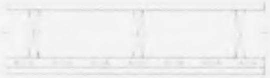
Type of Wall	Wall Number	Description	Fire-Resistance Rating[1]		Typical Sound Transmission Class[1][2][3] (STC)
			Loadbearing	Non-Loadbearing	
• Wood Studs • Single Row • Loadbearing or Non-Loadbearing	W2e	W2 with • no absorptive material[4] • 12.7 mm Type X gypsum board[5]	1 h	1.5 h	35
	W2f	W2 with • no absorptive material[4] • 12.7 mm regular gypsum board[5]	45 min	1 h	34
	W3	• 38 mm x 89 mm wood studs spaced 400 mm or 600 mm o.c. • 89 mm thick absorptive material[4] • resilient metal channels on one side spaced 400 mm or 600 mm o.c. • 1 layer of gypsum board on each side			
	W3a	W3 with • studs spaced 400 mm o.c. • 15.9 mm Type X gypsum board[5]	45 min	1 h	45
	W3b	W3 with • studs spaced 600 mm o.c. • 15.9 mm Type X gypsum board[5]	45 min	1 h	48
	W3c	W3 with • studs spaced 400 mm or 600 mm o.c. • 12.7 mm Type X gypsum board[5]	45 min	45 min	43
	W4	• 38 mm x 89 mm wood studs spaced 400 mm or 600 mm o.c. • 89 mm thick absorptive material[4] • resilient metal channels on one side spaced 400 mm or 600 mm o.c. • 2 layers of gypsum board on resilient metal channel side • 1 layer of gypsum board on other side			
	W4a	W4 with • studs spaced 400 mm o.c. • 15.9 mm Type X gypsum board[5]	1 h	1 h [1.5 h][6]	51
	W4b	W4 with • studs spaced 600 mm o.c. • 15.9 mm Type X gypsum board[5]	1 h	1 h [1.5 h][6]	54
	W4c	W4 with • studs spaced 400 mm o.c. • 12.7 mm Type X gypsum board[5]	45 min [1 h][6]	1 h	49
	W4d	W4 with • studs spaced 600 mm o.c. • 12.7 mm Type X gypsum board[5]	45 min [1 h][6]	1 h	53
Column 1	2	3	4	5	6

Table 1 (Cont'd)
Fire and Sound Resistance of Walls

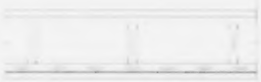
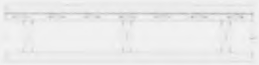
Type of Wall	Wall Number	Description	Fire-Resistance Rating(1)		Typical Sound Transmission Class(1)(2)(3) (STC)
			Loadbearing	Non-Loadbearing	
• Wood Studs • Single Row • Loadbearing or Non-Loadbearing	**W5**	• 38 mm x 89 mm wood studs spaced 400 mm or 600 mm o.c. • 89 mm thick absorptive material(4) • resilient metal channels on one side spaced 400 mm or 600 mm o.c. • 1 layer of gypsum board on resilient metal channel side • 2 layers of gypsum board on other side			
	W5a	W5 with • studs spaced 400 mm o.c. • 15.9 mm Type X gypsum board(5)	45 min	1 h	51
	W5b	W5 with • studs spaced 600 mm o.c. • 15.9 mm Type X gypsum board(5)	45 min	1 h	54
	W5c	W5 with • studs spaced 400 mm o.c. • 12.7 mm Type X gypsum board(5)	45 min	1 h	49
	W5d	W5 with • studs spaced 600 mm o.c. • 12.7 mm Type X gypsum board(5)	45 min	1 h	53
	W6	• 38 mm x 89 mm wood studs spaced 400 mm or 600 mm o.c. • with or without absorptive material • resilient metal channels on one side • 2 layers of gypsum board on each side			
	W6a	W6 with • studs spaced 400 mm or 600 mm o.c. • 89 mm thick absorptive material(4) • resilient metal channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board(5)	1.5 h	2 h	55
	W6b	W6 with • studs spaced 400 mm or 600 mm o.c. • 89 mm thick absorptive material(4) • resilient metal channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board(5)	1.5 h	2 h	58
	W6c	W6 with • studs spaced 400 mm o.c. • 89 mm thick absorptive material(4) • resilient metal channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board(5)	1 h	1.5 h	53
Column 1	2	3	4	5	6

Table 1 (Cont'd)
Fire and Sound Resistance of Walls

Type of Wall	Wall Number	Description	Fire-Resistance Rating(1)		Typical Sound Transmission Class(1)(2)(3) (STC)
			Loadbearing	Non-Loadbearing	
• Wood Studs • Single Row • Loadbearing or Non-Loadbearing	W6d	W6 with • studs spaced 400 mm o.c. • 89 mm thick absorptive material(4) • resilient metal channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board(5)	1 h	1.5 h	55
	W6e	W6 with • studs spaced 600 mm o.c. • 89 mm thick absorptive material(4) • resilient metal channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board(5)	1 h	1.5 h	55
	W6f	W6 with • studs spaced 600 mm o.c. • 89 mm thick absorptive material(4) • resilient metal channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board(5)	1 h	1.5 h	58
	W6g	W6 with • studs spaced 400 mm or 600 mm o.c. • 89 mm thick absorptive material(4) • resilient metal channels spaced 400 mm o.c. • 12.7 mm regular gypsum board(5)	45 min	1 h	50
	W6h	W6 with • studs spaced 400 mm or 600 mm o.c. • 89 mm thick absorptive material(4) • resilient metal channels spaced 600 mm o.c. • 12.7 mm regular gypsum board(5)	45 min	1 h	52
	W6i	W6 with • studs spaced 400 mm or 600 mm o.c. • no absorptive material • resilient metal channels spaced 400 mm or 600 mm o.c. • 15.9 mm Type X gypsum board(5)	1.5 h	2 h	47
	W6j	W6 with • studs spaced 400 mm or 600 mm o.c. • no absorptive material • resilient metal channels spaced 400 mm or 600 mm o.c. • 12.7 mm Type X gypsum board(5)	1 h	1.5 h	46
Column 1	2	3	4	5	6

Table 1 (Cont'd)
Fire and Sound Resistance of Walls

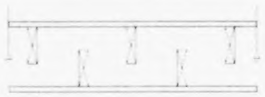
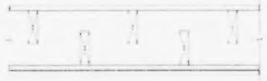
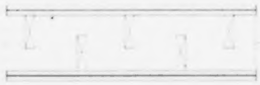
Type of Wall	Wall Number	Description	Fire-Resistance Rating(1)		Typical Sound Transmission Class(1)(2)(3) (STC)
			Loadbearing	Non-Loadbearing	
• Wood Studs • Two Rows Staggered on 38 mm x 140 mm plate • Loadbearing or Non-Loadbearing	**W7**	• two rows 38 mm x 89 mm wood studs each spaced 400 mm or 600 mm o.c. staggered on common 38 mm x 140 mm plate • 89 mm thick absorptive material on one side or 65 mm thick on each side(4) • 1 layer of gypsum board on each side			
	W7a	W7 with • 15.9 mm Type X gypsum board(5)	1 h	1 h	47
	W7b	W7 with • 12.7 mm Type X gypsum board(5)	45 min [1 h](6)	45 min [1 h](6)	45
	W7c	W7 with • 12.7 mm regular gypsum board(5)(7)	30 min	30 min [45 min](6)	42
	W8	• two rows 38 mm x 89 mm wood studs each spaced 400 mm or 600 mm o.c. staggered on common 38 mm x 140 mm plate • 89 mm thick absorptive material on one side or 65 mm thick on each side(4) • 2 layers of gypsum board on one side • 1 layer of gypsum board on other side			
	W8a	W8 with • 15.9 mm Type X gypsum board(5)	1 h	1.5 h	52
	W8b	W8 with • 12.7 mm Type X gypsum board(5)	45 min	1 h	50
	W9	• two rows 38 mm x 89 mm wood studs each spaced 400 mm or 600 mm o.c. staggered on common 38 mm x 140 mm plate • with or without absorptive material • 2 layers of gypsum board on each side			
	W9a	W9 with • 89 mm thick absorptive material on one side or 65 mm thick on each side(4) • 15.9 mm Type X gypsum board(5)	1.5 h	2 h	56
	W9b	W9 with • 89 mm thick absorptive material on one side or 65 mm thick on each side(4) • 12.7 mm Type X gypsum board(5)	1 h	1.5 h	55
	W9c	W9 with • 89 mm thick absorptive material on one side or 65 mm thick on each side(4) • 12.7 mm regular gypsum board(5)	45 min	1 h	53
Column 1	2	3	4	5	6

Table 1 (Cont'd)
Fire and Sound Resistance of Walls

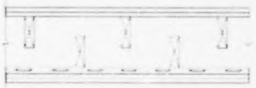
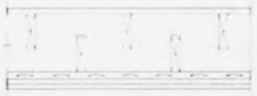
Type of Wall	Wall Number	Description	Fire-Resistance Rating(1)		Typical Sound Transmission Class(1)(2)(3) (STC)
			Loadbearing	Non-Loadbearing	
• Wood Studs • Two Rows Staggered on 38 mm x 140 mm plate • Loadbearing or Non-Loadbearing	W9d	W9 with • no absorptive material • 15.9 mm Type X gypsum board(5)	1.5 h	2 h	48
	W10	• two rows 38 mm x 89 mm wood studs each spaced 400 mm or 600 mm o.c. staggered on common 38 mm x 140 mm plate • with or without absorptive material • resilient metal channels on one side spaced 400 mm or 600 mm o.c. • 2 layers of gypsum board on each side			
	W10a	W10 with • 89 mm thick absorptive material on one side or 65 mm thick on each side(4) • 15.9 mm Type X gypsum board(5)	1.5 h	2 h	62
	W10b	W10 with • 89 mm thick absorptive material on one side or 65 mm thick on each side(4) • 12.7 mm Type X gypsum board(5)	1 h	1.5 h	60
	W10c	W10 with • no absorptive material • 15.9 mm Type X gypsum board(5)	1.5 h	2 h	50
	W10d	W10 with • no absorptive material • 12.7 mm Type X gypsum board(5)	1 h	1.5 h	48
	W11	• two rows 38 mm x 89 mm wood studs each spaced 400 mm or 600 mm o.c. staggered on common 38 mm x 140 mm plate • 89 mm thick absorptive material on one side or 65 mm thick on each side(4) • resilient metal channels on one side spaced 400 mm or 600 mm o.c. • 2 layers of gypsum board on resilient channel side • 1 layer of gypsum board on other side			
	W11a	W11 with • 15.9 mm Type X gypsum board(5)	1 h	1 h	56
	W11b	W11 with • 12.7 mm Type X gypsum board(5)	45 min [1 h](6)	1 h	54
Column 1	2	3	4	5	6

Table 1 (Cont'd)
Fire and Sound Resistance of Walls

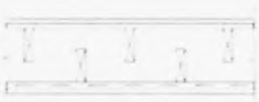
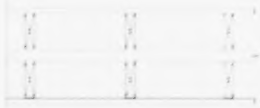
Type of Wall	Wall Number	Description	Fire-Resistance Rating[1]		Typical Sound Transmission Class[1][2][3] (STC)
			Loadbearing	Non-Loadbearing	
• Wood Studs • Two Rows Staggered on 38 mm x 140 mm plate • Loadbearing or Non-Loadbearing	**W12**	• two rows 38 mm x 89 mm wood studs each spaced 400 mm or 600 mm o.c. staggered on common 38 mm x 140 mm plate • 89 mm thick absorptive material on one side or 65 mm thick on each side[4] • resilient metal channels on one side spaced 400 mm or 600 mm o.c. • 1 layer of gypsum board on resilient metal channel side • 2 layers of gypsum board on other side			
	W12a	W12 with • 15.9 mm Type X gypsum board[5]	45 min	1 h	56
	W12b	W12 with • 12.7 mm Type X gypsum board[5]	45 min	1 h	54
• Wood Studs • Two Rows on Separate Plates • Loadbearing or Non-Loadbearing	**W13**	• two rows 38 mm x 89 mm wood studs each spaced 400 mm or 600 mm o.c. on separate 38 mm x 89 mm plates set 25 mm apart • with or without absorptive material • 1 layer of gypsum board on each side			
	W13a	W13 with • 89 mm thick absorptive material on each side[4][8] • 15.9 mm Type X gypsum board[5]	1 h	1 h	57
	W13b	W13 with • 89 mm thick absorptive material on each side[4][8] • 12.7 mm Type X gypsum board[5]	45 min [1 h][6]	45 min [1 h][6]	57
	W13c	W13 with • 89 mm thick absorptive material on one side only[4][8] • 15.9 mm Type X gypsum board[5]	1 h	1 h	54
	W13d	W13 with • 89 mm thick absorptive material on one side only[4][8] • 12.7 mm Type X gypsum board[5]	45 min	45 min	53
	W13e	W13 with • no absorptive material • 15.9 mm Type X gypsum board[5]	1 h	1 h	45
	W13f	W13 with • no absorptive material • 12.7 mm Type X gypsum board[5]	45 min	45 min	45
Column 1	2	3	4	5	6

Table 1 (Cont'd)
Fire and Sound Resistance of Walls

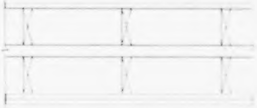
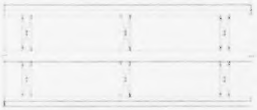
Type of Wall	Wall Number	Description	Fire-Resistance Rating(1)		Typical Sound Transmission Class(1)(2)(3) (STC)
			Loadbearing	Non-Loadbearing	
• Wood Studs • Two Rows on Separate Plates • Loadbearing or Non-Loadbearing	**W14**	• two rows 38 mm x 89 mm wood studs each spaced 400 mm or 600 mm o.c. on separate 38 mm x 89 mm plates set 25 mm apart • with or without absorptive material • 2 layers of gypsum board on one side • 1 layer of gypsum board on other side			
	W14a	W14 with • 89 mm thick absorptive material on each side(4)(8) • 15.9 Type X gypsum board(5)	1 h	1 h [1.5 h](6)	61
	W14b	W14 with • 89 mm thick absorptive material on each side(4)(8) • 12.7 Type X gypsum board(5)	45 min	1 h	61
	W14c	W14 with • 89 mm thick absorptive material on one side only(4)(8) • 15.9 Type X gypsum board(5)	1 h	1 h	57
	W14d	W14 with • 89 mm thick absorptive material on one side only(4)(8) • 12.7 Type X gypsum board(5)	45 min	1 h	57
	W14e	W14 with • no absorptive material • 15.9 Type X gypsum board(5)	1 h	1 h	51
	W14f	W14 with • no absorptive material • 12.7 Type X gypsum board(5)	45 min	1 h	51
	W15	• two rows 38 mm x 89 mm wood studs each spaced 400 mm or 600 mm o.c. on separate 38 mm x 89 mm plates set 25 mm apart • with or without absorptive material • 2 layers of gypsum board on each side			
	W15a	W15 with • 89 mm thick absorptive material on each side(4)(8) • 15.9 mm Type X gypsum board(5)	1.5 h	2 h	66
	W15b	W15 with • 89 mm thick absorptive material on each side(4)(8) • 12.7 mm Type X gypsum board(5)	1 h	1.5 h	65
	W15c	W15 with • 89 mm thick absorptive material on each side(4)(8) • 12.7 mm regular gypsum board(5)	45 min	1 h	61
	W15d	W15 with • 89 mm thick absorptive material on one side only(4)(8) • 15.9 mm Type X gypsum board(5)	1.5 h	2 h	62
Column 1	2	3	4	5	6

Table 1 (Cont'd)
Fire and Sound Resistance of Walls

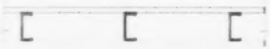
Type of Wall	Wall Number	Description	Fire-Resistance Rating(1)		Typical Sound Transmission Class(1)(2)(3) (STC)
			Loadbearing	Non-Loadbearing	
- Wood Studs - Two Rows on Separate Plates - Loadbearing or Non-Loadbearing	W15e	W15 with • 89 mm thick absorptive material on one side only(4)(8) • 12.7 mm Type X gypsum board(5)	1 h	1.5 h	60
	W15f	W15 with • 89 mm thick absorptive material on one side only(4)(8) • 12.7 mm regular gypsum board(5)	45 min	1 h	57
	W15g	W15 with • no absorptive material • 15.9 mm Type X gypsum board(5)	1.5 h	2 h	56
	W15h	W15 with • no absorptive material • 12.7 mm Type X gypsum board(5)	1 h	1.5 h	55
	W15i	W15 with • no absorptive material • 12.7 mm regular gypsum board(5)	45 min	1 h	51
- Exterior Wood Studs - Single Row - Loadbearing and Non-Loadbearing	**EW1**	• 38 mm x 89 mm wood studs spaced 400 mm or 600 mm o.c. • 89 mm thick absorptive material(6) • 1 or 2 layers of gypsum board on inside • exterior sheathing and siding			
	EW1a	EW1 with • 15.9 mm Type X gypsum board(5)(9)	1 h	1 h	N/A
	EW1b	EW1 with • 12.7 mm Type X gypsum board(5)(9)	45 min	45 min	N/A
	EW1c	EW1 with • 2 layers of 12.7 mm regular gypsum board(5)(9)	45 min	45 min	N/A
- Non-Loadbearing Steel Studs - 0.46 mm (25 Gauge)	**S1**	• 31 mm x 64 mm steel studs spaced 400 mm or 600 mm o.c. • with or without absorptive material • 1 layer of gypsum board on each side			
	S1a	S1 with • studs spaced 600 mm o.c. • 65 mm thick absorptive material(4) • 15.9 mm Type X gypsum board(5)	–	45 min [1 h](6)	43
	S1b	S1 with • studs spaced 400 mm o.c. • 65 mm thick absorptive material(4) • 15.9 mm Type X gypsum board(5)	–	45 min [1 h](6)	39
	S1c	S1 with • studs spaced 400 or 600 mm o.c. • no absorptive material • 15.9 mm Type X gypsum board(5)	–	45 min	35
Column 1	2	3	4	5	6

Table 1 (Cont'd)
Fire and Sound Resistance of Walls

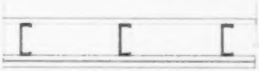
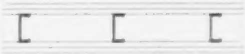
Type of Wall	Wall Number	Description	Fire-Resistance Rating[1]		Typical Sound Transmission Class[1][2][3] (STC)
			Loadbearing	Non-Loadbearing	
- Non-Loadbearing Steel Studs - 0.46 mm (25 Gauge)	**S2**	- 31 mm x 64 mm steel studs spaced 400 mm or 600 mm o.c. - with or without absorptive material - 1 layer of gypsum board on one side - 2 layers of gypsum board on other side			
	S2a	S2 with - studs spaced 600 mm o.c. - 65 mm thick absorptive material[4] - 15.9 mm Type X gypsum board[5]	–	1 h	50
	S2b	S2 with - studs spaced 400 mm o.c. - 65 mm thick absorptive material[4] - 15.9 mm Type X gypsum board[5]	–	1 h	44
	S2c	S2 with - studs spaced 600 mm o.c. - 65 mm thick absorptive material[4] - 12.7 mm Type X gypsum board[5]	–	1 h	50
	S2d	S2 with - studs spaced 400 mm o.c. - 65 mm thick absorptive material[4] - 12.7 mm Type X gypsum board[5]	–	1 h	42
	S2e	S2 with - studs spaced 600 mm o.c. - no absorptive material - 15.9 mm Type X gypsum board[5]	–	1 h	41
	S2f	S2 with - studs spaced 400 mm o.c. - no absorptive material - 15.9 mm Type X gypsum board[5]	–	1 h	37
	S2g	S2 with - studs spaced 600 mm o.c. - no absorptive material - 12.7 mm Type X gypsum board[5]	–	1 h	40
	S2h	S2 with - studs spaced 400 mm o.c. - no absorptive material - 12.7 mm Type X gypsum board[5]	–	1 h	35
	S3	- 31 mm x 64 mm steel studs spaced 400 mm or 600 mm o.c. - with or without absorptive material - 2 layers of gypsum board on each side			
Column 1	2	3	4	5	6

Table 1 (Cont'd)
Fire and Sound Resistance of Walls

Type of Wall	Wall Number	Description	Fire-Resistance Rating(1)		Typical Sound Transmission Class(1)(2)(3) (STC)
			Loadbearing	Non-Loadbearing	
• Non-Loadbearing Steel Studs • 0.46 mm (25 Gauge)	S3a	S3 with • studs spaced 600 mm o.c. • 65 mm thick absorptive material(4) • 15.9 mm Type X gypsum board(5)	–	2 h	54
	S3b	S3 with • studs spaced 400 mm o.c. • 65 mm thick absorptive material(4) • 15.9 mm Type X gypsum board(5)	–	2 h	51
	S3c	S3 with • studs spaced 600 mm o.c. • 65 mm thick absorptive material(4) • 12.7 mm Type X gypsum board(5)	–	1.5 h	53
	S3d	S3 with • studs spaced 400 mm o.c. • 65 mm thick absorptive material(4) • 12.7 mm Type X gypsum board(5)	–	1.5 h	47
	S3e	S3 with • studs spaced 600 mm o.c. • 65 mm thick absorptive material(4) • 12.7 mm regular gypsum board(5)	–	1 h	49
	S3f	S3 with • studs spaced 400 mm o.c. • 65 mm thick absorptive material(4) • 12.7 mm regular gypsum board(5)	–	1 h	41
	S3g	S3 with • studs spaced 600 mm o.c. • no absorptive material • 15.9 mm Type X gypsum board(5)	–	2 h	45
	S3h	S3 with • studs spaced 400 mm o.c. • no absorptive material • 15.9 mm Type X gypsum board(5)	–	2 h	42
	S3i	S3 with • studs spaced 600 mm o.c. • no absorptive material • 12.7 mm Type X gypsum board(5)	–	1.5 h	44
	S3j	S3 with • studs spaced 400 mm o.c. • no absorptive material • 12.7 mm Type X gypsum board(5)	–	1.5 h	39
Column 1	2	3	4	5	6

Table 1 (Cont'd)
Fire and Sound Resistance of Walls

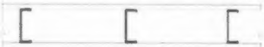
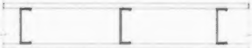
Type of Wall	Wall Number	Description	Fire-Resistance Rating(1)		Typical Sound Transmission Class(1)(2)(3) (STC)
			Loadbearing	Non-Loadbearing	
• Non-Loadbearing Steel Studs • 0.46 mm (25 Gauge)	S3k	S3 with • studs spaced 600 mm o.c. • no absorptive material • 12.7 mm regular gypsum board(5)	–	1 h	40
	S3l	S3 with • studs spaced 400 mm o.c. • no absorptive material • 12.7 mm regular gypsum board(5)	–	1 h	37
	S4	• 31 mm x 92 mm steel studs spaced 400 mm or 600 mm o.c. • with or without absorptive material • 1 layer of gypsum board on each side			
	S4a	S4 with • studs spaced 600 mm o.c. • 89 mm thick absorptive material(4) • 15.9 mm Type X gypsum board(5)	–	45 min [1 h](5)	48
	S4b	S4 with • studs spaced 400 mm o.c. • 89 mm thick absorptive material(4) • 15.9 mm Type X gypsum board(5)	–	45 min [1 h](5)	47
	S4c	S4 with • studs spaced 600 mm o.c. • no absorptive material • 15.9 mm Type X gypsum board(5)	–	45 min	38
	S4d	S4 with • studs spaced 400 mm o.c. • no absorptive material • 15.9 mm Type X gypsum board(5)	–	45 min	38
	S5	• 31 mm x 92 mm steel studs spaced 400 mm or 600 mm o.c. • with or without absorptive material • 1 layer of gypsum board on one side • 2 layers of gypsum board on other side			
	S5a	S5 with • studs spaced 600 mm o.c. • 89 mm thick absorptive material(4) • 15.9 mm Type X gypsum board(5)	–	1 h [1.5 h](6)	53
	S5b	S5 with • studs spaced 400 mm o.c. • 89 mm thick absorptive material(4) • 15.9 mm Type X gypsum board(5)	–	1 h [1.5 h](6)	52
Column 1	2	3	4	5	6

Table 1 (Cont'd)
Fire and Sound Resistance of Walls

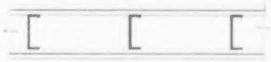
Type of Wall	Wall Number	Description	Fire-Resistance Rating(1)		Typical Sound Transmission Class(1)(2)(3) (STC)
			Loadbearing	Non-Loadbearing	
• Non-Loadbearing Steel Studs • 0.46 mm (25 Gauge)	S5c	S5 with • studs spaced 600 mm o.c. • 89 mm thick absorptive material(4) • 12.7 mm Type X gypsum board(5)	–	1 h [1.5 h](6)	51
	S5d	S5 with • studs spaced 400 mm o.c. • 89 mm thick absorptive material(4) • 12.7 mm Type X gypsum board(5)	–	1 h [1.5 h](6)	50
	S5e	S5 with • studs spaced 600 mm o.c. • no absorptive material • 15.9 mm Type X gypsum board(5)	–	1 h	43
	S5f	S5 with • studs spaced 400 mm o.c. • no absorptive material • 15.9 mm Type X gypsum board(5)	–	1 h	42
	S5g	S5 with • studs spaced 600 mm o.c. • no absorptive material • 12.7 mm Type X gypsum board(5)	—	1 h	41
	S5h	S5 with • studs spaced 400 mm o.c. • no absorptive material • 12.7 mm Type X gypsum board(5)	—	1 h	40
	S6	• 31 mm x 92 mm steel studs spaced 400 mm or 600 mm o.c. • with or without absorptive material • 2 layers of gypsum board on each side			
	S6a	S6 with • studs spaced 600 mm o.c. • 89 mm thick absorptive material(4) • 15.9 mm Type X gypsum board(5)	—	2 h	56
	S6b	S6 with • studs spaced 400 mm o.c. • 89 mm thick absorptive material(4) • 15.9 mm Type X gypsum board(5)	—	2 h	55
	S6c	S6 with • studs spaced 600 mm o.c. • 89 mm thick absorptive material(4) • 12.7 mm Type X gypsum board(5)	—	1.5 h	55
Column 1	2	3	4	5	6

Table 1 (Cont'd)
Fire and Sound Resistance of Walls

Type of Wall	Wall Number	Description	Fire-Resistance Rating[1]		Typical Sound Transmission Class[1][2][3] (STC)
			Loadbearing	Non-Loadbearing	
- Non-Loadbearing Steel Studs - 0.46 mm (25 Gauge)	S6d	S6 with • studs spaced 400 mm o.c. • 89 mm thick absorptive material[4] • 12.7 mm Type X gypsum board[5]	—	1.5 h	54
	S6e	S6 with • studs spaced 600 mm o.c. • 89 mm thick absorptive material[4] • 12.7 mm regular gypsum board[5]	—	1 h	50
	S6f	S6 with • studs spaced 400 mm o.c. • 89 mm thick absorptive material[4] • 12.7 mm regular gypsum board[5]	—	1 h	48
	S6g	S6 with • studs spaced 600 mm o.c. • no absorptive material • 15.9 mm Type X gypsum board[5]	—	2 h	47
	S6h	S6 with • studs spaced 400 mm o.c. • no absorptive material • 15.9 mm Type X gypsum board[5]	—	2 h	45
	S6i	S6 with • studs spaced 600 mm o.c. • no absorptive material • 12.7 mm Type X gypsum board[5]	—	1.5 h	45
	S6j	S6 with • studs spaced 400 mm o.c. • no absorptive material • 12.7 mm Type X gypsum board[5]	—	1.5	44
	S6k	S6 with • studs spaced 600 mm o.c. • no absorptive material • 12.7 mm regular gypsum board[5]	—	1 h	41
	S6l	S6 with • studs spaced 400 mm o.c. • no absorptive material • 12.7 mm regular gypsum board[5]	—	1 h	39
	S7	• 31 mm x 152 mm steel studs spaced 400 mm or 600 mm o.c. • with or without absorptive material • 1 layer of gypsum board on each side			
Column 1	2	3	4	5	6

Table 1 (Cont'd)
Fire and Sound Resistance of Walls

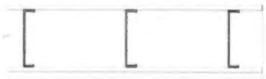
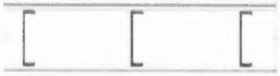
Type of Wall	Wall Number	Description	Fire-Resistance Rating(1)		Typical Sound Transmission Class(1)(2)(3) (STC)
			Loadbearing	Non-Loadbearing	
• Non-Loadbearing Steel Studs • 0.46 mm (25 Gauge)	S7a	S7 with • 150 mm thick absorptive material(4) • 15.9 mm Type X gypsum board(5)	—	45 min [1 h(6)]	51
	S7b	S7 with • no absorptive material • 15.9 mm Type X gypsum board(5)	—	45 min	41
	S8	• 31 mm x 152 mm steel studs spaced 400 mm or 600 mm o.c. • with or without absorptive material • 1 layer of gypsum board on one side • 2 layers of gypsum board on other side			
	S8a	S8 with • 150 mm thick absorptive material(4) • 15.9 mm Type X gypsum board(5)	—	1 h [1.5 h(6)]	55
	S8b	S8 with • 150 mm thick absorptive material(4) • 12.7 mm Type X gypsum board(5)	—	1 h [1.5 h(6)]	54
	S8c	S8 with • no absorptive material • 15.9 mm Type X gypsum board(5)	—	1 h	45
	S8d	S8 with • no absorptive material • 12.7 mm Type X gypsum board(5)	—	1 h	44
	S9	• 31 mm x 152 mm steel studs spaced 400 mm or 600 mm o.c. • with or without absorptive material • 2 layers of gypsum board on each side			
	S9a	S9 with • 150 mm thick absorptive material(4) • 15.9 mm Type X gypsum board(5)	—	2 h	59
	S9b	S9 with • 150 mm thick absorptive material(4) • 12.7 mm Type X gypsum board(5)	—	1.5 h	57
	S9c	S9 with • 150 mm thick absorptive material(4) • 12.7 mm regular gypsum board(5)	—	1 h	53
	S9d	S9 with • no absorptive material • 15.9 mm Type X gypsum board(5)	—	2 h	49
Column 1	2	3	4	5	6

Table 1 (Cont'd)
Fire and Sound Resistance of Walls

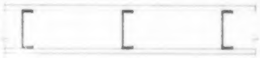
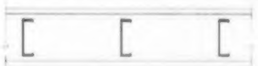
Type of Wall	Wall Number	Description	Fire-Resistance Rating[1]		Typical Sound Transmission Class[1][2][3] (STC)
			Loadbearing	Non-Loadbearing	
• Non-Loadbearing Steel Studs • 0.46 mm (25 Gauge)	S9e	S9 with • no absorptive material • 12.7 mm Type X gypsum board[5]	—	1.5 h	47
	S9f	S9 with • no absorptive material • 12.7 mm regular gypsum board[5]	—	1 h	43
• Loadbearing Steel Studs • 0.91 mm or 1.22 mm thickness (18 or 20 Gauge)	**S10**	• 92 mm loadbearing steel studs spaced 400 mm o.c. • with or without absorptive material • 1 layer of gypsum board on each side			
	S10a	S10 with • 89 mm thick absorptive material[4] • 15.9 mm Type X gypsum board[5]	—	—	34
	S10b	S10 with • no absorptive material • 15.9 mm Type X gypsum board[5]	—	—	32
	S11	• 92 mm loadbearing steel studs spaced 400 mm o.c. • with or without absorptive material • 2 layers of gypsum board on each side			
	S11a	S11 with • 89 mm thick absorptive material[4] • 15.9 mm Type X gypsum board[5]	—	—	38
	S11b	S11 with • 89 mm thick absorptive material[4] • 12.7 mm Type X gypsum board[5]	—	—	38
	S11c	S11 with • 89 mm thick absorptive material[4] • 12.7 mm regular gypsum board[5]	—	—	36
	S11d	S11 with • no absorptive material • 15.9 mm Type X gypsum board[5]	—	—	36
	S11e	S11 with • no absorptive material • 12.7 mm Type X gypsum board[5]	—	—	35
	S11f	S11 with • no absorptive material • 12.7 mm regular gypsum board[5]	—	—	34
Column 1	2	3	4	5	6

Table 1 (Cont'd)
Fire and Sound Resistance of Walls

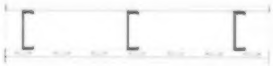
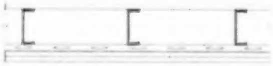
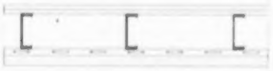
Type of Wall	Wall Number	Description	Fire-Resistance Rating(1)		Typical Sound Transmission Class(1)(2)(3) (STC)
			Loadbearing	Non-Loadbearing	
• Loadbearing Steel Studs • 0.91 mm or 1.22 mm thickness (18 or 20 Gauge	**S12**	• 92 mm loadbearing steel studs spaced 400 mm o.c. • with or without absorptive material • resilient metal channels on one side spaced at 600 mm o.c. • 1 layer of gypsum board on each side			
	S12a	S12 with • 89 mm thick absorptive material[4] • 15.9 mm Type X gypsum board(5)	—	—	49
	S12b	S12 with • no absorptive material • 15.9 mm Type X gypsum board(5)	—	—	39
	S13	• 92 mm loadbearing steel studs spaced 400 mm o.c. • with or without absorptive material • resilient metal channels on one side spaced at 600 mm o.c. • 2 layers of gypsum board on resilient channel side • 1 layer of gypsum board on other side			
	S13a	S13 with • 89 mm thick absorptive material[4] • 15.9 mm Type X gypsum board(5)	—	—	54
	S13b	S13 with • no absorptive material • 15.9 mm Type X gypsum board(5)	—	—	44
	S14	• 92 mm loadbearing steel studs spaced 400 mm o.c. • with or without absorptive material • resilient metal channels on one side spaced at 600 mm o.c. • 2 layers of gypsum board on each side			
	S14a	S14 with • 89 mm thick absorptive material[4] • 15.9 mm Type X gypsum board(5)	—	—	61
	S14b	S14 with • 89 mm thick absorptive material[4] • 12.7 mm Type X gypsum board(5)	—	—	59
	S14c	S14 with • 89 mm thick absorptive material[4] • 12.7 mm regular gypsum board(5)	—	—	54
	S14d	S14 with • no absorptive material • 15.9 mm Type X gypsum board(5)	—	—	51
Column 1	2	3	4	5	6

Table 1 (Cont'd)
Fire and Sound Resistance of Walls

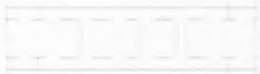
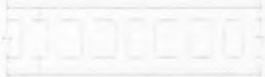
Type of Wall	Wall Number	Description	Fire-Resistance Rating(1)		Typical Sound Transmission Class(1)(2)(3) (STC)
			Loadbearing	Non-Loadbearing	
• Loadbearing Steel Studs • 0.91 mm or 1.22 mm thickness (18 or 20 Gauge	S14e	S14 with • no absorptive material • 12.7 mm Type X gypsum board(5)	—	—	49
	S14f	S14 with • no absorptive material • 12.7 mm regular gypsum board(5)	—	—	45
• Hollow Concrete Block (Normal Weight Aggregate)	**B1**	• 140 mm or 190 mm concrete block			
	B1a	• 140 mm bare concrete block(3)	1 h	1 h	48
	B1b	• 190 mm bare concrete block(3)	1.5 h	1.5 h	50
	B2	• 140 mm or 190 mm concrete block • no absorptive material • 1 layer of gypsum-sand plaster or gypsum board on each side			
	B2a	B2 with • 140 mm concrete block • 12.7 mm gypsum-sand plaster	2 h	2 h	50
	B2b	B2 with • 140 mm concrete block • 12.7 mm Type X gypsum board or 15.9 mm Type X gypsum board(5)	2 h	2 h	47
	B2c	B2 with • 140 mm concrete block • 12.7 mm regular gypsum board(5)	1.5 h	1.5 h	46
	B2d	B2 with • 190 mm concrete block • 12.7 mm gypsum-sand plaster	2.5 h	2.5 h	51
	B2e	B2 with • 190 mm concrete block • 15.9 mm Type X gypsum board(5)	3 h	3 h	50
	B2f	B2 with • 190 mm concrete block • 12.7 mm Type X gypsum board(5)	2.5 h	2.5 h	49
	B2g	B2 with • 190 mm concrete block • 12.7 mm regular gypsum board(5)	2 h	2 h	48
Column 1	2	3	4	5	6

Table 1 (Cont'd)
Fire and Sound Resistance of Walls

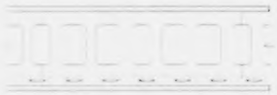
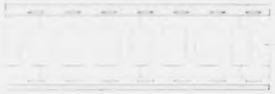
Type of Wall	Wall Number	Description	Fire-Resistance Rating(1)		Typical Sound Transmission Class(1)(2)(3) (STC)
			Loadbearing	Non-Loadbearing	
- Hollow Concrete Block (Normal Weight Aggregate)	**B3**	- 140 mm or 190 mm concrete block - resilient metal channels on one side spaced at 400 mm or 600 mm o.c. - absorptive material filling resilient metal channel space(4) - 1 layer of gypsum board on each side			
	B3a	B3 with - 140 mm concrete block - 12.7 mm Type X gypsum board or 15.9 mm Type X gypsum board(5)	2 h	2 h	51
	B3b	B3 with - 140 mm concrete block - 12.7 mm regular gypsum board(5)(7)	1.5 h	1.5 h	48
	B3c	B3 with - 190 mm concrete block - 15.9 mm Type X gypsum board(5)	3 h	3 h	54
	B3d	B3 with - 190 mm concrete block - 12.7 mm Type X gypsum board(5)	2.5 h	2.5 h	53
	B3e	B3 with - 190 mm concrete block - 12.7 mm regular gypsum board(5)(7)	2 h	2 h	51
	B4	- 140 mm or 190 mm concrete block - resilient metal channels on each side spaced at 400 mm or 600 mm o.c. - with or without absorptive material - 1 layer of gypsum board on each side			
	B4a	B4 with - 140 mm concrete block - 12.7 mm Type X gypsum board or 15.9 mm Type X gypsum board(5)	2 h	2 h	47
	B4b	B4 with - 140 mm concrete block - 12.7 mm regular gypsum board(5)(7)	1.5 h	1.5 h	42
	B4c	B4 with - 190 mm concrete block - 15.9 mm Type X gypsum board(5)	3 h	3 h	50
	B4d	B4 with - 190 mm concrete block - 12.7 mm Type X gypsum board(5)	2.5 h	2.5 h	49
Column 1	2	3	4	5	6

Table 1 (Cont'd)
Fire and Sound Resistance of Walls

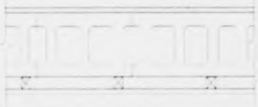
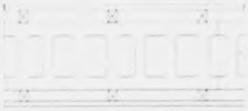
Type of Wall	Wall Number	Description	Fire-Resistance Rating(1)		Typical Sound Transmission Class(1)(2)(3) (STC)
			Loadbearing	Non-Loadbearing	
- Hollow Concrete Block (Normal Weight Aggregate)	B4e	B4 with - 190 mm concrete block - 12.7 mm regular gypsum board(5)(7)	2 h	2 h	45
	B5	- 190 mm concrete block - 38 mm x 38 mm horizontal or vertical wood strapping on one side spaced at 600 mm o.c. - with or without absorptive material - 1 layer of gypsum board on each side			
	B5a	B5 with - 15.9 mm Type X gypsum board(5)	3 h	3 h	54
	B5b	B5 with - 12.7 mm Type X gypsum board(5)	2.5 h	2.5 h	53
	B5c	B5 with - 12.7 mm regular gypsum board(5)(7)	2 h	2 h	51
	B6	- 140 mm or 190 mm concrete block - 38 mm x 38 mm horizontal or vertical wood strapping on each side spaced at 600 mm o.c - absorptive material filling strapping space on each side(4) - 1 layer of gypsum board on each side			
	B6a	B6 with - 140 mm concrete block - 12.7 mm Type X gypsum board or 15.9 mm Type X gypsum board(5)	2 h	2 h	57
	B6b	B6 with - 140 mm concrete block - 12.7 mm regular gypsum board(5)(7)	1.5 h	1.5 h	56
	B6c	B6 with - 190 mm concrete block - 15.9 mm Type X gypsum board(5)	3 h	3 h	60
	B6d	B6 with - 190 mm concrete block - 12.7 mm Type X gypsum(5)	2.5 h	2.5 h	59
	B6e	B6 with - 190 mm concrete block - 12.7 mm regular gypsum board(5)(7)	2 h	2 h	57
Column 1	2	3	4	5	6

Table 1 (Cont'd)
Fire and Sound Resistance of Walls

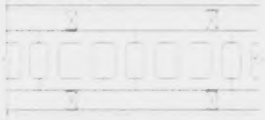
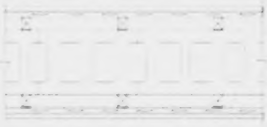
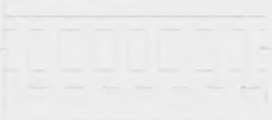
Type of Wall	Wall Number	Description	Fire-Resistance Rating(1)		Typical Sound Transmission Class(1)(2)(3) (STC)
			Loadbearing	Non-Loadbearing	
• Hollow Concrete Block (Normal Weight Aggregate)	**B7**	• 190 mm concrete block • 65 mm steel studs each side spaced at 600 mm o.c. • absorptive material filling stud space on each side(4) • 1 layer of gypsum board on each side			
	B7a	B7 with • 15.9 mm Type X gypsum board(5)	3 h	3 h	71
	B7b	B7 with • 12.7 mm Type X gypsum board(5)	2.5 h	2.5 h	70
	B7c	B7 with • 12.7 mm regular gypsum board(5)(7)	2 h	2 h	69
	B8	• 190 mm concrete block • 38 mm x 64 mm wood studs on each side spaced at 600 mm o.c. • absorptive material filling stud space on each side(4) • 1 layer of gypsum board on each side			
	B8a	B8 with • 15.9 mm Type X gypsum board(5)	3 h	3 h	71
	B8b	B8 with • 12.7 mm Type X gypsum board(5)	2.5 h	2.5 h	70
	B8c	B8 with • 12.7 mm regular gypsum board(5)(7)	2 h	2 h	69
	B9	• 190 mm concrete block • 50 mm metal Z-bars on each side spaced at 600 mm o.c. (or 38 mm x 38 mm horizontal or vertical wood strapping plus resilient metal channels) • absorptive material filling Z-bar space on each side(4) • 1 layer of gypsum board on each side			
	B9a	B9 with • 15.9 mm Type X gypsum board(5)	3 h	3 h	65
	B9b	B9 with • 12.7 mm Type X gypsum board(5)	2.5 h	2.5 h	64
	B9c	B9 with • 12.7 mm regular gypsum board(5)(7)	2 h	2 h	63
	B10	• 190 mm concrete block • resilient metal channels on one side spaced at 600 mm o.c. • absorptive material filling resilient metal channel space(4) • 2 layers of gypsum board on one side only			
Column 1	2	3	4	5	6

Table 1 (Cont'd)
Fire and Sound Resistance of Walls

Type of Wall	Wall Number	Description	Fire-Resistance Rating[1]		Typical Sound Transmission Class[1][2][3] (STC)
			Loadbearing	Non-Loadbearing	
• Hollow Concrete Block (Normal Weight Aggregate)	B10a	B10 with • 15.9 mm Type X gypsum board[5]	3 h	3 h	56
	B10b	B10 with • 12.7 mm Type X gypsum board[5]	2.5 h	2.5 h	55
	B10c	B10 with • 12.7 mm regular gypsum board[5][7]	2 h	2 h	54
Column 1	2	3	4	5	6

Notes to Table 1:

(1) Fire-resistance and STC ratings of wood frame construction were evaluated only for 38 mm x 89 mm constructions. The fire-resistance ratings and STC ratings provided for 38 mm x 89 mm wood frame construction, however, may be applied to 38 mm x 140 mm wood frame construction; in some cases the ratings may be conservative. Where 38 mm x 140 mm framing is used and absorptive material is called for, the absorptive material must be 140 mm thick.

(2) Sound ratings listed are based on the most reliable laboratory test data available for specimens conforming to installation details required by CSA-A82.31, "Gypsum Board Application." Results of specific tests may differ slightly because of measurement precision and minor variations in construction details. These results should only be used where the actual construction details, including spacing or fasteners and supporting framing, correspond exactly to the details of the test specimens on which the ratings are based. Assemblies with sound transmission class ratings of 50 or more require acoustical sealant applied around electrical boxes and other openings, and at the junction of intersecting walls and floors, except intersection of walls constructed of concrete or solid brick.

(3) Sound ratings are only valid where there are no discernible cracks or voids in the visible surfaces. For concrete blocks, surfaces must be sealed by at least 2 coats of paint or other surface finish described in Section 9.29. of Division B to prevent sound leakage.

(4) Sound absorptive material includes fibre processed from rock, slag, glass or cellulose fibre. It must fill at least 90% of the cavity thickness for the wall to provide the listed STC value. The absorptive material should not overfill the cavity to the point of producing significant outward pressure on the finishes; such an assembly will not achieve the STC rating. Where the absorptive material used with steel stud assemblies is in batt form, "steel stud batts", which are wide enough to fill the cavity from the web of one stud to the web of the adjacent studs, must be used.

(5) The complete descriptions of indicated finishes are as follows:
- 12.7 mm regular gypsum board – 12.7 mm regular gypsum board conforming to Article 9.29.5.2. of Division B.
- 12.7 mm Type X gypsum board – 12.7 mm special fire-resistant Type X gypsum board conforming to Article 9.29.5.2. of Division B.
- 15.9 mm Type X gypsum board – 15.9 mm special fire-resistant Type X gypsum board conforming to Article 9.29.5.2. of Division B.
- Except for exterior walls (see Note 2), the outer layer of finish on both sides of the wall must have its joints taped and finished.
- Fastener types and spacing must conform to CSA-A82.31-M, "Gypsum Board Application".

(6) Absorptive material required for the higher fire-resistance rating is mineral fibre processed from rock or slag with a mass of at least 4.8 kg/m² for 150 mm thickness, 2.8 kg/m² for 89 mm thickness and 2.0 kg/m² for 65 mm thickness and completely filling the wall cavity. For assemblies with double wood studs on separate plates, absorptive material is required in the stud cavities on both sides.

(7) Regular gypsum board used in single layer assemblies must be installed so all edges are supported.

(8) Where bracing material, such as diagonal lumber or plywood, OSB, gypsum board or fibreboard sheathing is installed on the inner face of one row of studs in double stud assemblies, the STC rating will be reduced by 3 for any assemblies containing absorptive material in both rows of studs or in the row of studs opposite to that which the bracing material is attached. Attaching such layers on both inner faces of the studs may drastically reduce the STC value but enough data to permit assignment of STC ratings for this situation is not available. The fire-resistance rating is not affected by the inclusion of such bracing.

(9) For exterior walls, the finish joints must be taped and finished for the outer layer of the interior side only. The gypsum board on the exterior side may be replaced with gypsum sheathing of the same thickness and type (regular or Type X).

Section 2 Fire and Sound Resistance of Floors, Ceilings and Roofs

Table 2
Fire and Sound Resistance of Floors, Ceilings and Roofs

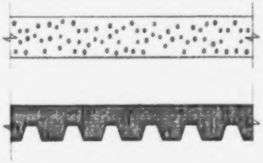
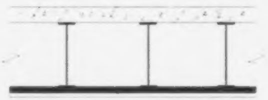
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Concrete Slabs	**F1**	• concrete floors			
	F1a	• 90 mm reinforced concrete with 20 mm minimum cover over reinforcing steel	1 h	48	23
	F1b	• 130 mm reinforced concrete with 25 mm minimum cover over reinforcing steel	2 h	52	27
	F1c	• pre-stressed hollow core slab 200 mm deep with 25 mm minimum cover over reinforcing steel	1 h	50	28
	F1d	• 150 mm composite slab on 75 mm steel deck with 152 x 152 x MW3.8 x MW3.8 wire mesh	—	51	21
	F1e	• 150 mm composite slab on 75 mm steel deck with 152 x 152 x MW3.8 x MW3.8 wire mesh • resilient metal channels 400 mm or 600 mm o.c. • 2 layers of 12.7 mm Type X gypsum board or 2 layers of 15.9 mm Type X gypsum board	1.5 h	57	36
Open Web Steel Joists	**F2**	• open web steel joists with concrete floor			
	F2a	• 50 mm thick concrete deck • on open web steel joists spaced 400 mm o.c. • furring channels spaced not more than 600 mm o.c. wired to underside of joists • 1 layer of 15.9 mm Type X gypsum board on ceiling side	45 min	53	27
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

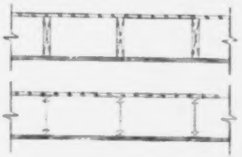
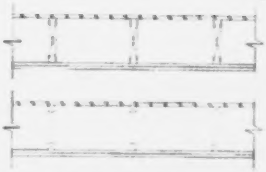
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Open Web Steel Joists	F2b	• 65 mm regular concrete minimum 155 kg/m^2 • on composite steel joists spaced 1250 mm o.c. • furring channels spaced not more than 600 mm o.c. wired to underside of joists • 1 layer of 12.7 mm or 15.9 mm Type X gypsum board on ceiling side	1.5 h	53	28
Wood Floor Joists • Wood Joists min 38 mm x 235 mm • Wood I-Joists min 38 mm x 38 mm flange 9.5 mm OSB or plywood web, minimum 241 mm deep	**F3**	• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on wood joists spaced not more than 600 mm o.c. • with or without absorptive material in cavity • 1 layer of gypsum board on ceiling side			
	F3a	F3 with • no absorptive material in cavity • 15.9 mm Type X gypsum board	–	33	28
	F3b	F3 with • absorptive material in cavity • 15.9 mm Type X gypsum board	–	34	30
	F3c	F3 with • no absorptive material in cavity • 12.7 mm Type X gypsum board	–	32	27
	F3d	F3 with • absorptive material in cavity • 12.7 mm Type X gypsum board	–	33	29
	F3e	F3 with • no absorptive material in cavity • 12.7 mm regular gypsum board	–	31	26
	F3f	F3 with • absorptive material in cavity • 12.7 mm regular gypsum board	–	32	28
	F4	• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on wood joists spaced not more than 600 mm o.c. • with or without absorptive material in cavity • 2 layers of gypsum board on ceiling side			
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

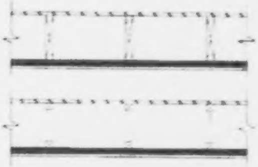
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Wood Floor Joists • Wood Joists min 38 mm x 235 mm • Wood I-Joists min 38 mm x 38 mm flange 9.5 mm OSB or plywood web, minimum 241 mm deep	F4a	F4 with • no absorptive material in cavity • 15.9 mm Type X gypsum board	–	36	31
	F4b	F4 with • absorptive material in cavity • 15.9 mm Type X gypsum board	–	37	33
	F4c	F4 with • no absorptive material in cavity • 12.7 mm Type X gypsum board	–	35	30
	F4d	F4 with • absorptive material in cavity • 12.7 mm Type X gypsum board	–	36	32
	F4e	F4 with • no absorptive material in cavity • 12.7 mm regular gypsum board	–	34	29
	F4f	F4 with • absorptive material in cavity • 12.7 mm regular gypsum board	–	35	31
	F5	• subfloor of 15.5 mm plywood, OSB or waferboard,or 17 mm tongue and groove lumber • on wood joists spaced not more than 600 mm o.c. • with or without absorptive material in cavity • metal furring channels spaced 400 mm or 600 mm o.c. • 1 layer of gypsum board on ceiling side			
	F5a	F5 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum	–	38	31
	F5b	F5 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c • 15.9 mm Type X gypsum board	–	39	32
	F5c	F5 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board	30 min [45 min](11)	41	34
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Wood Floor Joists • Wood Joists min 38 mm x 235 mm • Wood I-Joists min 38 mm x 38 mm flange 9.5 mm OSB or plywood web, minimum 241 mm deep	F5d	F5 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	30 min [45 min](11)	42	35
	F5e	F5 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	–	37	30
	F5f	F5 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	–	38	31
	F5g	F5 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	30 min [45 min](11)	40	33
	F5h	F5 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	30 min [45 min](11)	41	34
	F5i	F5 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	< 30 min	36	29
	F5j	F5 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board	< 30 min	37	30
	F5k	F5 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	< 30 min	39	32
	F5l	F5 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board	< 30 min	40	33
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

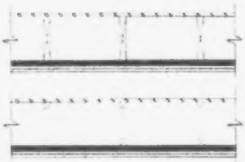
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Wood Floor Joists • Wood Joists min 38 mm x 235 mm • Wood I-Joists min 38 mm x 38 mm flange 9.5 mm OSB or plywood web, minimum 241 mm deep	**F6**	• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on wood joists spaced not more than 600 mm o.c. • with or without absorptive material in cavity • metal furring channels spaced 400 mm or 600 mm o.c. • 2 layers of gypsum board on ceiling side			
	F6a	F6 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board	1 h	41	34
	F6b	F6 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	1 h	42	35
	F6c	F6 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board	1 h	44	37
	F6d	F6 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	1 h	45	38
	F6e	F6 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	1 h	40	33
	F6f	F6 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	1 h	41	34
	F6g	F6 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	1 h	43	36
	F6h	F6 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	1 h	44	37
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

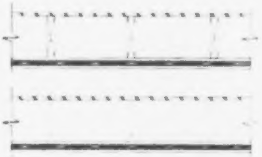
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Wood Floor Joists • Wood Joists min 38 mm x 235 mm • Wood I-Joists min 38 mm x 38 mm flange 9.5 mm OSB or plywood web, minimum 241 mm deep	F6i	F6 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	–	39	32
	F6j	F6 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board	–	40	33
	F6k	F6 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	–	42	35
	F6l	F6 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board	–	43	36
	F7	• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on wood joists spaced not more than 600 mm o.c. • with or without absorptive material in cavity • 1 layer of gypsum board attached directly to joists on ceiling side • resilient metal channels spaced 400 mm or 600 mm o.c. attached to joists through gypsum board • 1 layer of gypsum board attached to resilient channel			
	F7a	F7 with • no absorptive material in cavity • 15.9 mm Type X gypsum board • resilient metal channels • 15.9 mm Type X gypsum board	1 h	35	27
	F7b	F7 with • absorptive material in cavity • 15.9 mm Type X gypsum board • resilient metal channels • 15.9 mm Type X gypsum board	1 h	37	30
	F7c	F7 with • no absorptive material in cavity • 12.7 mm Type X gypsum board • resilient metal channels • 12.7 mm Type X gypsum board	1 h	35	37
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

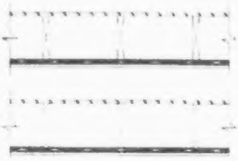
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Wood Floor Joists • Wood Joists min 38 mm x 235 mm • Wood I-Joists min 38 mm x 38 mm flange 9.5 mm OSB or plywood web, minimum 241 mm deep	F7d	F7 with • absorptive material in cavity • 12.7 mm Type X gypsum board • resilient metal channels • 12.7 mm Type X gypsum board	1 h	37	30
	F7e	F7 with • no absorptive material in cavity • 12.7 mm regular gypsum board • resilient metal channels • 12.7 mm regular gypsum board	-	32	26
	F7f	F7 with • absorptive material in cavity • 12.7 mm regular gypsum board • resilient metal channels • 12.7 mm regular gypsum board	-	35	28
	F8	• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on wood joists spaced not more than 600 mm o.c. • with or without absorptive material in cavity • resilient metal channels spaced 400 mm or 600 mm o.c. • 1 layer of gypsum board on ceiling side			
	F8a	F8 with • no absorptive material in cavity • resilient metal channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board	-	39	32
	F8b	F8 with • no absorptive material in cavity • resilient metal channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	-	41	34
	F8c	F8 with • absorptive material in cavity • resilient metal channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board	30 min [45 min](11)	48(9)	40
	F8d	F8 with • absorptive material in cavity • resilient metal channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	30 min [45 min](11)	49(9)	42
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

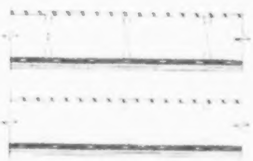
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating[4][5][6][7]	Typical Sound Transmission Class[4][5][8][9] (STC)	Typical Impact Insulation Class[4][8][10] (IIC)
Floors and Ceilings					
Wood Floor Joists • Wood Joists min 38 mm x 235 mm • Wood I-Joists min 38 mm x 38 mm flange 9.5 mm OSB or plywood web, minimum 241 mm deep	F8e	F8 with • no absorptive material in cavity • resilient metal channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	30 min	39	32
	F8f	F8 with • no absorptive material in cavity • resilient metal channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	30 min	41	34
	F8g	F8 with • absorptive material in cavity • resilient metal channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	30 min [45 min][11]	48[9]	39
	F8h	F8 with • absorptive material in cavity • resilient metal channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	30 min [45 min][11]	49[9]	42
	F8i	F8 with • no absorptive material in cavity • resilient metal channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	< 30 min	37	31
	F8j	F8 with • no absorptive material in cavity • resilient metal channels spaced 600 mm o.c. • 12.7 mm regular gypsum board	< 30 min	39	33
	F8k	F8 with • absorptive material in cavity • resilient metal channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	< 30 min	45	37
	F8l	F8 with • absorptive material in cavity • resilient metal channels spaced 600 mm o.c. • 12.7 mm regular gypsum board	< 30 min	47	40
	F9	• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on wood joists spaced not more than 600 mm o.c. • with or without absorptive material in cavity • resilient metal channels spaced 400 mm or 600 mm o.c. • 2 layers of gypsum board on ceiling side			
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Wood Floor Joists • Wood Joists min 38 mm x 235 mm • Wood I-Joists min 38 mm x 38 mm flange 9.5 mm OSB or plywood web, minimum 241 mm deep	F9a	F9 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c • 15.9 mm Type X gypsum	1 h	47	38
	F9b	F9 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c • 15.9 mm Type X gypsum board	1 h	48[illegible]	40
	F9c	F9 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c • 15.9 mm Type X gypsum board	1 h	54	47
	F9d	F9 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c • 15.9 mm Type X gypsum board	1 h	55	49
	F9e	F9 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c • 12.7 mm Type X gypsum board	1 h	47	38
	F9f	F9 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c • 12.7 mm Type X gypsum board	1 h	48[illegible]	40
	F9g	F9 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c • 12.7 mm Type X gypsum board	1 h	54	47
	F9h	F9 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c • 12.7 mm Type X gypsum board	1 h	55	49
	F9i	F9 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c • 12.7 mm regular gypsum board	–	45	36
	F9j	F9 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c • 12.7 mm regular gypsum board		46	37
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

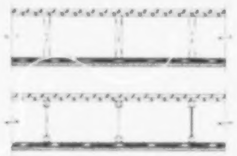
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating$^{(4)(5)(6)(7)}$	Typical Sound Transmission Class$^{(4)(5)(8)(9)}$ (STC)	Typical Impact Insulation Class$^{(4)(8)(10)}$ (IIC)
Floors and Ceilings					
Wood Floor Joists • Wood Joists min 38 mm x 235 mm • Wood I-Joists min 38 mm x 38 mm flange 9.5 mm OSB or plywood web, minimum 241 mm deep	F9k	F9 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	–	52	45
	F9l	F9 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board	–	53	46
	F10	• one subfloor layer of 11 mm sanded plywood, or OSB or waferboard • one subfloor layer of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on wood joists spaced not more than 600 mm o.c. • with or without absorptive material in cavity • resilient metal channels spaced 400 mm or 600 mm o.c. • 1 layer of gypsum board on ceiling side			
	F10a	F10 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum		41	34
	F10b	F10 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	–	42	35
	F10c	F10 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board	30 min [45 min]$^{(11)(12)}$	50	43
	F10d	F10 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board		51	44
	F10e	F10 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board		41	34
	F10f	F10 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	–	42	35
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

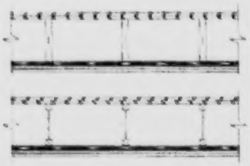
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Wood Floor Joists • Wood Joists min 38 mm x 235 mm • Wood I-Joists min 38 mm x 38 mm flange 9.5 mm OSB or plywood web. minimum 241 mm deep	F10g	F10 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	–	50	43
	F10h	F10 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	–	51	44
	F10i	F10 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	–	40	32
	F10j	F10 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board		41	33
	F10k	F10 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	–	48(9)	40
	F10l	F10 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board	–	49(9)	41
	F11	• one subfloor layer of 11 mm sanded plywood, or OSB or waferboard • one subfloor layer of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on wood joists spaced not more than 600 mm o.c. • with or without absorptive material in cavity • resilient metal channels spaced 400 mm or 600 mm o.c. • 2 layers of gypsum board on ceiling side			
	F11a	F11 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum	1 h	50	41
	F11b	F11 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	1 h	51	42
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Wood Floor Joists • Wood Joists min 38 mm x 235 mm • Wood I-Joists min 38 mm x 38 mm flange 9.5 mm OSB or plywood web, minimum 241 mm deep	F11c	F11 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board	1 h	57	50
	F11d	F11 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	1 h	58	51
	F11e	F11 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	1 h	50	41
	F11f	F11 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	1 h	51	42
	F11g	F11 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	1 h	57	50
	F11h	F11 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	1 h	58	51
	F11i	F11 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board		46	39
	F11j	F11 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board		47	41
	F11k	F11 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	-	53	46
	F11l	F11 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board		54	47
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

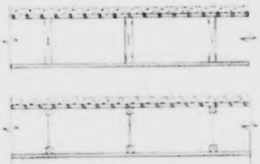
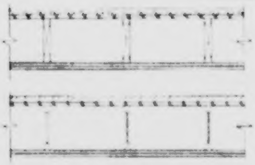
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
		Floors and Ceilings			
Wood Floor Joists • Wood Joists min 38 mm x 235 mm • Wood I-Joists min 38 mm x 38 mm flange 9.5 mm OSB or plywood web, minimum 241 mm deep	**F12**	• 25 mm gypsum-concrete topping (at least 44 kg/m^2) • subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on wood joists spaced not more than 600 mm o.c. • with or without absorptive material in cavity • 1 layer of gypsum board on ceiling side			
	F12a	F12 with • no absorptive material in cavity • 15.9 mm Type X gypsum board		39	26
	F12b	F12 with • absorptive material in cavity • 15.9 mm Type X gypsum board		40	28
	F12c	F12 with • no absorptive material in cavity • 12.7 mm regular gypsum board		39	26
	F12d	F12 with • absorptive material in cavity • 12.7 mm regular gypsum board		40	28
	F12e	F12 with • no absorptive material in cavity • 12.7 mm regular gypsum board		36	25
	F12f	F12 with • absorptive material in cavity • 12.7 mm regular gypsum board		38	26
	F13	• 25 mm gypsum-concrete topping (at least 44 kg/m^2) • subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on wood joists spaced not more than 600 mm o.c. • with or without absorptive material in cavity • 2 layers of gypsum board on ceiling side			
	F13a	F13 with • no absorptive material in cavity • 15.9 mm Type X gypsum board	–	41	30
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

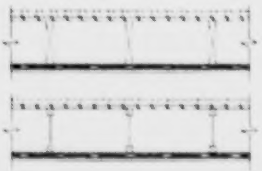
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating[(4)(5)(6)(7)]	Typical Sound Transmission Class[(4)(5)(8)(9)] (STC)	Typical Impact Insulation Class[(4)(8)(10)] (IIC)
Floors and Ceilings					
Wood Floor Joists • Wood Joists min 38 mm x 235 mm • Wood I-Joists min 38 mm x 38 mm flange 9.5 mm OSB or plywood web, minimum 241 mm deep	F13b	F13 with • absorptive material in cavity • 15.9 mm Type X gypsum board	–	43	32
	F13c	F13 with • no absorptive material in cavity • 12.7 mm Type X gypsum board	–	41	30
	F13d	F13 with • absorptive material in cavity • 12.7 mm Type X gypsum board	–	43	32
	F13e	F13 with • no absorptive material in cavity • 12.7 mm regular gypsum board	–	38	29
	F13f	F13 with • absorptive material in cavity • 12.7 mm regular gypsum board	–	40	30
	F14	• 25 mm gypsum-concrete topping (at least 44 kg/m^2) • subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on wood joists spaced not more than 600 mm o.c. • with or without absorptive material in cavity • resilient metal channels spaced 400 mm or 600 mm o.c. • 1 layer of gypsum board on ceiling side			
	F14a	F14 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum	–	51	20
	F14b	F14 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board		53	22
	F14c	F14 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board	30 min [45 min][(11)(12)]	57	24
	F14d	F14 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	–	58	26
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Wood Floor Joists • Wood Joists min 38 mm x 235 mm • Wood I-Joists min 38 mm x 38 mm flange 9.5 mm OSB or plywood web minimum 241 mm deep	F14e	F14 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	-	51	20
	F14f	F14 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	-	53	22
	F14g	F14 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board		57	24
	F14h	F14 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board		58	26
	F14i	F14 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board		49[illegible]	19
	F14j	F14 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board		51	21
	F14k	F14 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board		54	22
	F14l	F14 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board		55	24
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

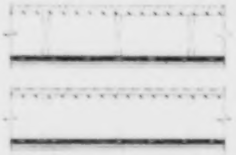
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Wood Floor Joists • Wood Joists min 38 mm x 235 mm • Wood I-Joists min 38 mm x 38 mm flange 9.5 mm OSB or plywood web, minimum 241 mm deep	**F15**	• 25 mm gypsum-concrete topping (at least 44 kg/m^2) • subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on wood joists spaced not more than 600 mm o.c. • with or without absorptive material in cavity • resilient metal channels spaced 400 mm or 600 mm o.c. • 2 layers of gypsum board on ceiling side			
	F15a	F15 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum	1 h(12)	55	26
	F15b	F15 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board		57	28
	F15c	F15 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board	-	61	30
	F15d	F15 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board		62	32
	F15e	F15 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	1 h(12)	55	26
	F15f	F15 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	-	57	28
	F15g	F15 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	-	61	30
	F15h	F15 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board		62	32
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

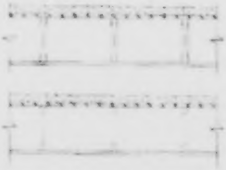
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating[illegible]	Typical Sound Transmission Class[illegible] (STC)	Typical Impact Insulation Class[illegible] (IIC)
		Floors and Ceilings			
Wood Floor Joists • Wood Joists min 38 mm x 235 mm • Wood I-Joists min 38 mm x 38 mm flange 9.5 mm OSB or plywood web minimum 241 mm deep	F15i	F15 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board		53	25
	F15j	F15 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board		55	27
	F15k	F15 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board		58	28
	F15l	F15 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board		59	30
	F16	• 38 mm concrete topping (at least 70 kg/m²) • subfloor of 15.5 mm plywood, OSB or waferboard or 17 mm tongue and groove lumber • on wood joists spaced not more than 600 mm o.c. • with or without absorptive material in cavity • 1 layer of board on ceiling side			
	F16a	F 16 with • no absorptive material in cavity • 15.9 mm Type X gypsum board		46	25
	F16b	F16 with • absorptive material in cavity • 15.9 mm Type X gypsum board		48[illegible]	28
	F16c	F16 with • no absorptive material in cavity • 12.7 mm Type X gypsum board		46	25
	F16d	F16 with • absorptive material in cavity • 12.7 mm Type X gypsum board		48[illegible]	28
	F16e	F16 with • no absorptive material in cavity • 12.7 mm regular gypsum board		42	24
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

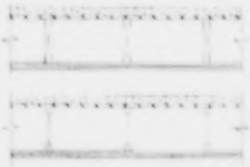
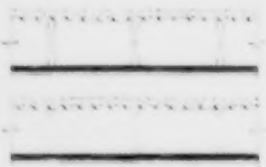
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating[illegible]	Typical Sound Transmission Class[illegible] (STC)	Typical Impact Insulation Class[illegible] (IIC)
Floors and Ceilings					
Wood Floor Joists • Wood Joists min 38 mm x 235 mm • Wood I-Joists min 38 mm x 38 mm flange 9.5 mm OSB or plywood web, minimum 241 mm deep	F16f	F16 with • absorptive material in cavity • 12.7 mm regular gypsum board		44	25
	F17	• 38 mm concrete topping (at least 70 kg/m²) • subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on wood joists spaced not more than 600 mm o.c. • with or without absorptive material in cavity • 2 layers of gypsum board on ceiling side			
	F17a	F17 with • no absorptive material in cavity • 15.9 mm Type X gypsum board	—	47	30
	F17b	F17 with • absorptive material in cavity • 15.9 mm Type X gypsum board	—	49[illegible]	32
	F17c	F17 with • no absorptive material in cavity • 12.7 mm Type X gypsum board	—	47	30
	F17d	F17 with • absorptive material in cavity • 12.7 mm Type X gypsum board	—	49[illegible]	32
	F17e	F17 with • no absorptive material in cavity • 12.7 mm regular gypsum board	—	43	29
	F17f	F17 with • absorptive material in cavity • 12.7 mm regular gypsum board	—	45	30
	F18	• 38 mm concrete topping (at least 70 kg/m²) • subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on wood joists spaced not more than 600 mm o.c. • with or without absorptive material in cavity • metal furring channels spaced 400 mm or 600 mm o.c. • 1 layer of gypsum board on ceiling side			
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Wood Floor Joists • Wood Joists min 38 mm x 235 mm • Wood I-Joists min 38 mm x 38 mm flange 9.5 mm OSB or plywood web minimum 241 mm deep	F18a	F18 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum		51	27
	F18b	F18 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board		52	27
	F18c	F18 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board		53	30
	F18d	F18 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board		54	30
	F18e	F18 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board		51	27
	F18f	F18 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board		52	27
	F18g	F18 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board		53	30
	F18h	F18 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board		54	30
	F18i	F18 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board		47	25
	F18j	F18 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board		48[illegible]	25
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

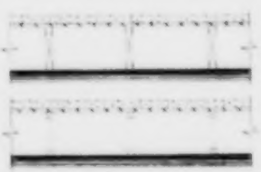
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(9)(10) (IIC)
Floors and Ceilings					
Wood Floor Joists • Wood Joists min 38 mm x 235 mm • Wood I-Joists min 38 mm x 38 mm flange 9.5 mm OSB or plywood web, minimum 241 mm deep	F18k	F18 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	–	49(9)	29
	F18l	F18 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board	–	50	29
	F19	• 38 mm concrete topping (at least 70 kg/m²) • subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on wood joists spaced not more than 600 mm o.c. • with or without absorptive material in cavity • metal furring channels spaced 400 mm or 600 mm o.c. • 2 layers of gypsum board on ceiling side			
	F19a	F19 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum	1 h	52	31
	F19b	F19 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	–	53	32
	F19c	F19 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board	–	54	34
	F19d	F19 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board		55	35
	F19e	F19 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	1 h	52	31
	F19f	F19 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board		53	32
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

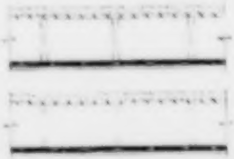
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating	Typical Sound Transmission Class (STC)	Typical Impact Insulation Class (IIC)
Floors and Ceilings					
Wood Floor Joists • Wood Joists min 38 mm x 235 mm • Wood I-Joists min 38 mm x 38 mm flange 9.5 mm OSB or plywood web minimum 241 mm deep	F19g	F19 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board		54	34
	F19h	F19 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board		55	35
	F19i	F19 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board		50	30
	F19j	F19 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board		51	31
	F19k	F19 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board		52	33
	F19l	F19 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board		53	34
	F20	• 38 mm concrete topping (at least 70 kg/m²) • subfloor of 15.5 mm plywood, OSB or waferboard or 17 mm tongue and groove lumber • on wood joists spaced not more than 600 mm o.c. • with or without absorptive material in cavity • resilient metal channels spaced 400 mm or 600 mm o.c. • 1 layer of gypsum board on ceiling side			
	F20a	F20 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum	[45 min]	57	28
	F20b	F20 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board		59	30
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

Type of Assembly	Assembly Number	Description	Fire-Resistance Rating[(4)(5)(6)(7)]	Typical Sound Transmission Class[(4)(5)(8)(9)] (STC)	Typical Impact Insulation Class[(4)(8)(9)(10)] (IIC)
Floors and Ceilings					
Wood Floor Joists • Wood Joists min 38 mm x 235 mm • Wood I-Joists min 38 mm x 38 mm flange 9.5 mm OSB or plywood web, minimum 241 mm deep	F20c	F20 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board	30 min [45 min][(11)(12)]	64	35
	F20d	F20 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board		65	38
	F20e	F20 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board		57	28
	F20f	F20 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board		59	30
	F20g	F20 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board		64	35
	F20h	F20 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	–	65	38
	F20i	F20 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board		55	27
	F20j	F20 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board		57	29
	F20k	F20 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	–	62	34
	F20l	F20 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board		63	37
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

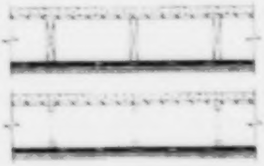
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating[illegible]	Typical Sound Transmission Class[illegible] (STC)	Typical Impact Insulation Class[illegible] (IIC)
Floors and Ceilings					
Wood Floor Joists • Wood Joists min 38 mm x 235 mm • Wood I-Joists min 38 mm x 38 mm flange 9.5 mm OSB or plywood web minimum 241 mm deep	**F21**	• 38 mm concrete topping (at least 70 kg/m²) • subfloor of 15.5 mm plywood, OSB or waferboard or 17 mm tongue and groove lumber • on wood joists spaced not more than 600 mm o.c. • with or without absorptive material in cavity • resilient metal channels spaced 400 mm or 600 mm o.c. • 2 layers of gypsum board on ceiling side			
	F21a	F21 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum	1 h	64	36
	F21b	F21 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board		65	38
	F21c	F21 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board	-	69	44
	F21d	F21 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	-	70	46
	F21e	F21 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	1 h	64	36
	F21f	F21 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board		65	38
	F21g	F21 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board		69	44
	F21h	F21 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board		70	46
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

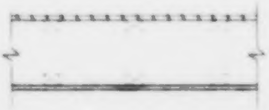
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating[illegible]	Typical Sound Transmission Class[illegible] (STC)	Typical Impact Insulation Class[illegible] (IIC)
Floors and Ceilings					
Wood Floor Trusses (wood framing members not less than 38 mm x 89 mm with metal connector plates not less than 1 mm thick with teeth not less than 8 mm in length - minimum 235 mm depth)	F21i	F21 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	–	62	34
	F21j	F21 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board	–	63	35
	F21k	F21 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board		67	42
	F21l	F21 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board		68	43
	F22	• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on wood trusses spaced not more than 600 mm o.c. • with or without absorptive material in cavity • 1 layer gypsum board on ceiling side			
	F22a	F22 with • no absorptive material in cavity • 15.9 mm Type X gypsum board		33	28
	F22b	F22 with • absorptive material in cavity • 15.9 mm Type X gypsum board		34	30
	F22c	F22 with • no absorptive material in cavity • 12.7 mm Type X gypsum board	–	32	27
	F22d	F22 with • absorptive material in cavity • 12.7 mm Type X gypsum board	–	33	29
	F22e	F22 with • no absorptive material in cavity • 12.7 mm regular gypsum board		31	26
	F22f	F22 with • absorptive material in cavity • 12.7 mm regular gypsum board	–	32	28
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

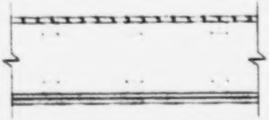
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating[4][5][6][7]	Typical Sound Transmission Class[4][5][8][9] (STC)	Typical Impact Insulation Class[4][8][10] (IIC)
Floors and Ceilings					
Wood Floor Trusses (wood framing members not less than 38 mm x 89 mm with metal connector plates not less than 1 mm thick with teeth not less than 8 mm in length - minimum 235 mm depth)	**F23**	• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on wood trusses spaced not more than 600 mm o.c. • with or without absorptive material in cavity • 2 layers of gypsum board on ceiling side			
	F23a	F23 with • no absorptive material in cavity • 15.9 mm Type X gypsum board	-	36	31
	F23b	F23 with • absorptive material in cavity • 15.9 mm Type X gypsum board	-	37	33
	F23c	F23 with • no absorptive material in cavity • 12.7 mm Type X gypsum board	-	35	30
	F23d	F23 with • absorptive material in cavity • 12.7 mm Type X gypsum board	-	36	32
	F23e	F23 with • no absorptive material in cavity • 12.7 mm regular gypsum board	-	34	29
	F23f	F23 with • absorptive material in cavity • 12.7 mm regular gypsum board	-	35	31
	F24	• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on wood trusses spaced not more than 600 mm o.c. • with or without absorptive material in cavity • metal furring channels spaced 400 mm or 600 mm o.c. • 1 layer of gypsum board on ceiling side			
	F24a	F24 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum	-	38	31
	F24b	F24 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c • 15.9 mm Type X gypsum board	-	39	32
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

Type of Assembly	Assembly Number	Description	Fire-Resistance Rating[4][5][6][7]	Typical Sound Transmission Class[4][5][8][9] (STC)	Typical Impact Insulation Class[4][8][10] (IIC)
Floors and Ceilings					
Wood Floor Trusses (wood framing members not less than 38 mm x 89 mm with metal connector plates not less than 1 mm thick with teeth not less than 8 mm in length - minimum 235 mm depth)	F24c	F24 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board	–	41	34
	F24d	F24 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	–	42	35
	F24e	F24 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	–	37	30
	F24f	F24 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	–	38	31
	F24g	F24 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	–	40	33
	F24h	F24 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	–	41	34
	F24i	F24 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board		36	29
	F24j	F24 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board	–	37	30
	F24k	F24 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	–	39	32
	F24l	F24 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board		40	33
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

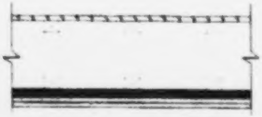
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating[4][5][6][7]	Typical Sound Transmission Class[4][5][8][9] (STC)	Typical Impact Insulation Class[4][8][10] (IIC)
Floors and Ceilings					
Wood Floor Trusses (wood framing members not less than 38 mm x 89 mm with metal connector plates not less than 1 mm thick with teeth not less than 8 mm in length - minimum 235 mm depth)	**F25**	• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on wood trusses spaced not more than 600 mm o.c. • with or without absorptive material in cavity • metal furring channels spaced 400 mm or 600 mm o.c. • 2 layers of gypsum board on ceiling side			
	F25a	F25 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum	-	41	34
	F25b	F25 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	-	42	35
	F25c	F25 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board	-	44	37
	F25d	F25 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	-	45	38
	F25e	F25 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	-	40	33
	F25f	F25 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	-	41	34
	F25g	F25 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board		43	36
	F25h	F25 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board		44	37
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

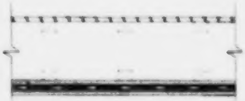
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Wood Floor Trusses (wood framing members not less than 38 mm x 89 mm with metal connector plates not less than 1 mm thick with teeth not less than 8 mm in length - minimum 235 mm depth)	F25i	F25 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	–	39	32
	F25j	F25 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board	–	40	33
	F25k	F25 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board		42	35
	F25l	F25 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board		43	36
	F26	• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on wood trusses spaced not more than 600 mm o.c. • with or without absorptive material in cavity • 1 layer of gypsum board attached directly to trusses on ceiling side • resilient metal channels spaced 400 mm or 600 mm o.c. attached to trusses through the gypsum board • 1 layer of gypsum board attached to resilient channel			
	F26a	F26 with • no absorptive material in cavity • 15.9 mm Type X gypsum board • resilient metal channels • 15.9 mm Type X gypsum board		35	27
	F26b	F26 with • absorptive material in cavity • 15.9 mm Type X gypsum board • resilient metal channels • 15.9 mm Type X gypsum board	-	37	30
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

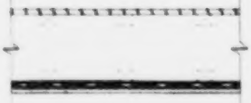
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Wood Floor Trusses (wood framing members not less than 38 mm x 89 mm with metal connector plates not less than 1 mm thick with teeth not less than 8 mm in length - minimum 235 mm depth)	F26c	F26 with • no absorptive material in cavity • 12.7 mm Type X gypsum board • resilient metal channels • 12.7 mm Type X gypsum board	-	35	27
	F26d	F26 with • absorptive material in cavity • 12.7 mm Type X gypsum board • resilient metal channels • 12.7 mm Type X gypsum board		37	30
	F26e	F26 with • no absorptive material in cavity • 12.7 mm regular gypsum board • resilient metal channels • 12.7 mm regular gypsum board	-	32	26
	F26f	F26 with • absorptive material in cavity • 12.7 mm regular gypsum board • resilient metal channels • 12.7 mm regular gypsum board		35	28
	F27	• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on wood trusses spaced not more than 600 mm o.c. • with or without absorptive material in cavity • resilient metal channels spaced 400 mm or 600 mm o.c. • 1 layer of gypsum board on ceiling side			
	F27a	F27 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum		39	32
	F27b	F27 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	-	41	34
	F27c	F27 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board	30 min [45 min](11)	48(5)	39
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Wood Floor Trusses (wood framing members not less than 38 mm x 89 mm with metal connector plates not less than 1 mm thick with teeth not less than 8 mm in length - minimum 235 mm depth)	F27d	F27 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	-	49(9)	42
	F27e	F27 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	-	40	34
	F27f	F27 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board		41	34
	F27g	F27 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	-	48(9)	39
	F27h	F27 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	-	49(9)	42
	F27i	F27 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	-	37	31
	F27j	F27 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board		39	33
	F27k	F27 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board		45	37
	F27l	F27 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board	-	47	40
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Wood Floor Trusses (wood framing members not less than 38 mm x 89 mm with metal connector plates not less than 1 mm thick with teeth not less than 8 mm in length - minimum 235 mm depth)	**F28**	• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on wood trusses spaced not more than 600 mm o.c. • with or without absorptive material in cavity • resilient metal channels spaced 400 mm or 600 mm o.c. • 2 layers of gypsum board on ceiling side			
	F28a	F28 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum	-	47	38
	F28b	F28 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	-	48(9)	40
	F28c	F28 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board		54	47
	F28d	F28 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board		55	49
	F28e	F28 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	-	47	38
	F28f	F28 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	-	48(9)	40
	F28g	F28 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board		54	47
	F28h	F28 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board		55	49
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Wood Floor Trusses (wood framing members not less than 38 mm x 89 mm with metal connector plates not less than 1 mm thick with teeth not less than 8 mm in length - minimum 235 mm depth)	F28i	F28 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	-	45	36
	F28j	F28 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board	-	46	37
	F28k	F28 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board		52	45
	F28l	F28 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board		53	46
	F29	• one subfloor layer 11 mm sanded plywood, or OSB or waferboard • one subfloor layer of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on wood trusses spaced not more than 600 mm o.c. • with or without absorptive material in cavity • resilient metal channels spaced 400 mm or 600 mm o.c. • 1 layer of gypsum board on ceiling side			
	F29a	F29 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum		42	34
	F29b	F29 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board		43	35
	F29c	F29 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board	30 min [45 min](13)	50	43
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

Type of Assembly	Assembly Number	Description	Fire-Resistance Rating[4][5][6][7]	Typical Sound Transmission Class[4][5][8][9] (STC)	Typical Impact Insulation Class[4][8][10] (IIC)
Floors and Ceilings					
Wood Floor Trusses (wood framing members not less than 38 mm x 89 mm with metal connector plates not less than 1 mm thick with teeth not less than 8 mm in length - minimum 235 mm depth)	F29d	F29 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	–	51	44
	F29e	F29 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	–	42	34
	F29f	F29 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board		43	35
	F29g	F29 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board		50	43
	F29h	F29 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	–	51	44
	F29i	F29 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	–	40	32
	F29j	F29 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board		41	33
	F29k	F29 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board		48[11]	40
	F29l	F29 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board	–	49[11]	41
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

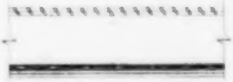
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating[4][5][6][7]	Typical Sound Transmission Class[4][5][8][9] (STC)	Typical Impact Insulation Class[4][8][10] (IIC)
Floors and Ceilings					
Wood Floor Trusses (wood framing members not less than 38 mm x 89 mm with metal connector plates not less than 1 mm thick with teeth not less than 8 mm in length - minimum 235 mm depth)	**F30**	• one subfloor layer 11 mm sanded plywood, or OSB or waferboard • one subfloor layer of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on wood trusses spaced not more than 600 mm o.c. • with or without absorptive material in cavity • resilient metal channels spaced 400 mm or 600 mm o.c. • 2 layers of gypsum board on ceiling side			
	F30a	F30 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum	–	49[9]	40
	F30b	F30 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board		50	43
	F30c	F30 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board		57	50
	F30d	F30 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	–	58	51
	F30e	F30 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board		50	41
	F30f	F30 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board		50	41
	F30g	F30 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board		57	50
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class (4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Wood Floor Trusses (wood framing members not less than 38 mm x 89 mm with metal connector plates not less than 1 mm thick with teeth not less than 8 mm in length - minimum 235 mm depth)	F30h	F30 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	–	58	51
	F30i	F30 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	–	46	39
	F30j	F30 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board		47	41
	F30k	F30 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board		53	46
	F30l	F30 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board	–	54	47
	F31	• 25 mm gypsum-concrete topping (at least 44 kg/m^2) • subfloor of 15.5 mm plywood, OSB or waferboard or 17 mm tongue and groove lumber • on wood trusses spaced not more than 600 mm o.c. • with or without absorptive material in cavity • 1 layer of gypsum board on ceiling side			
	F31a	F31 with • no absorptive material in cavity • 15.9 mm Type X gypsum board		39	26
	F31b	F31 with • absorptive material in cavity • 15.9 mm Type X gypsum board		40	28
	F31c	F31 with • no absorptive material in cavity • 12.7 mm Type X gypsum board		39	26
	F31d	F31 with • absorptive material in cavity • 12.7 mm Type X gypsum board		40	28
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

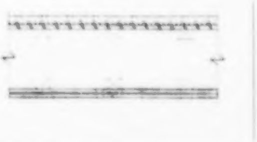
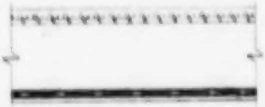
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating$^{(4)(5)(6)(7)}$	Typical Sound Transmission Class[illegible] (STC)	Typical Impact Insulation Class[illegible] (IIC)
Floors and Ceilings					
Wood Floor Trusses (wood framing members not less than 38 mm x 89 mm with metal connector plates not less than 1 mm thick with teeth not less than 8 mm in length - minimum 235 mm depth)	F31e	F31 with • no absorptive material in cavity • 12.7 mm regular gypsum board		36	25
	F31f	F31 with • absorptive material in cavity • 12.7 mm regular gypsum board	–	38	26
	F32	• 25 mm gypsum-concrete topping (at least 44 kg/m²) • subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on wood trusses spaced not more than 600 mm o.c. • with or without absorptive material in cavity • 2 layers of gypsum board on ceiling side			
	F32a	F32 with • no absorptive material in cavity • 15.9 mm Type X gypsum board	–	41	30
	F32b	F32 with • absorptive material in cavity • 15.9 mm Type X gypsum board	–	43	32
	F32c	F32 with • no absorptive material in cavity • 12.7 mm Type X gypsum board	–	41	30
	F32d	F32 with • absorptive material in cavity • 12.7 mm Type X gypsum board	–	43	32
	F32e	F32 with • no absorptive material in cavity • 12.7 mm regular gypsum board		38	29
	F32f	F32 with • absorptive material in cavity • 12.7 mm regular gypsum board		40	30
	F33	• 25 mm gypsum-concrete topping (at least 44 kg/m²) • subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on wood trusses spaced not more than 600 mm o.c. • with or without absorptive material in cavity • resilient metal channels spaced 400 mm or 600 mm o.c. • 1 layer of gypsum board on ceiling side			
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

Type of Assembly	Assembly Number	Description	Fire-Resistance Rating[illegible]	Typical Sound Transmission Class[illegible] (STC)	Typical Impact Insulation Class[illegible] (IIC)
Floors and Ceilings					
Wood Floor Trusses (wood framing members not less than 38 mm x 89 mm with metal connector plates not less than 1 mm thick with teeth not less than 8 mm in length - minimum 235 mm depth)	F33a	F33 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum	–	51	20
	F33b	F33 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	–	53	22
	F33c	F33 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board	30 min [45 min][illegible]	57	24
	F33d	F33 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board		58	26
	F33e	F33 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board		51	20
	F33f	F33 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board		53	22
	F33g	F33 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board		57	24
	F33h	F33 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board		58	26
	F33i	F33 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board		49[illegible]	19
	F33j	F33 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board		51	21
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

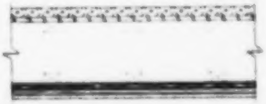
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Wood Floor Trusses (wood framing members not less than 38 mm x 89 mm with metal connector plates not less than 1 mm thick with teeth not less than 8 mm in length - minimum 235 mm depth)	F33k	F33 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board		54	22
	F33l	F33 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board	–	55	24
	F34	• 25 mm gypsum-concrete topping (at least 44 kg/m²) • subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on wood trusses spaced not more than 600 mm o.c. • with or without absorptive material in cavity • resilient metal channels spaced 400 mm or 600 mm o.c. • 2 layers of gypsum board on ceiling side			
	F34a	F34 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum	1 h	55	26
	F34b	F34 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board		57	28
	F34c	F34 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board		61	30
	F34d	F34 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board		62	32
	F34e	F34 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	45 min	55	26
	F34f	F34 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	–	57	28
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

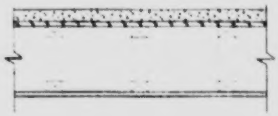
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Wood Floor Trusses (wood framing members not less than 38 mm x 89 mm with metal connector plates not less than 1 mm thick with teeth not less than 8 mm in length - minimum 235 mm depth)	F34g	F34 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	-	61	30
	F34h	F34 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	-	62	32
	F34i	F34 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	-	53	25
	F34j	F34 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board	-	55	27
	F34k	F34 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	-	58	28
	F34l	F34 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board	-	59	30
	F35	• 38 mm concrete topping (at least 70 kg/m^2) • subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on wood trusses spaced not more than 600 mm o.c. • with or without absorptive material in cavity • 1 layer of gypsum board on ceiling side			
	F35a	F35 with • no absorptive material in cavity • 15.9 mm Type X gypsum board	-	46	25
	F35b	F35 with • absorptive material in cavity • 15.9 mm Type X gypsum board	-	48(9)	28
	F35c	F35 with • no absorptive material in cavity • 12.7 mm Type X gypsum board	-	46	25
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

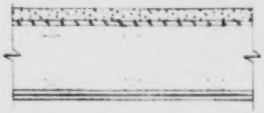
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating[4][5][6][7]	Typical Sound Transmission Class[4][5][8][9] (STC)	Typical Impact Insulation Class[4][8][10] (IIC)
Floors and Ceilings					
Wood Floor Trusses (wood framing members not less than 38 mm x 89 mm with metal connector plates not less than 1 mm thick with teeth not less than 8 mm in length - minimum 235 mm depth)	F35d	F35 with • absorptive material in cavity • 12.7 mm Type X gypsum board	–	48[9]	28
	F35e	F35 with • no absorptive material in cavity • 12.7 mm regular gypsum board	–	42	24
	F35f	F35 with • absorptive material in cavity • 12.7 mm regular gypsum board	–	44	25
	F36	• 38 mm concrete topping (at least 70 kg/m²) • subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on wood trusses spaced not more than 600 mm o.c. • with or without absorptive material in cavity • 2 layers of gypsum board on ceiling side			
	F36a	F36 with • no absorptive material in cavity • 15.9 mm Type X gypsum board	–	47	30
	F36b	F36 with • absorptive material in cavity • 15.9 mm Type X gypsum board	–	49[9]	32
	F36c	F36 with • no absorptive material in cavity • 12.7 mm Type X gypsum board	–	47	30
	F36d	F36 with • absorptive material in cavity • 12.7 mm Type X gypsum board	–	49[9]	32
	F36e	F36 with • no absorptive material in cavity • 12.7 mm regular gypsum board	–	43	29
	F36f	F36 with • absorptive material in cavity • 12.7 mm regular gypsum board	–	45	30
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

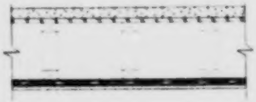
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Wood Floor Trusses (wood framing members not less than 38 mm x 89 mm with metal connector plates not less than 1 mm thick with teeth not less than 8 mm in length - minimum 235 mm depth)	**F37**	• 38 mm concrete topping (at least 70 kg/m²) • subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on wood trusses spaced not more than 600 mm o.c. • with or without absorptive material in cavity • resilient metal channels spaced 400 mm or 600 mm o.c. • 1 layer of gypsum board on ceiling side			
	F37a	F37 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum	45 min	57	28
	F37b	F37 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board		59	30
	F37c	F37 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board	30 min [45 min](11)	64	35
	F37d	F37 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	-	65	38
	F37e	F37 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	-	57	28
	F37f	F37 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board		59	30
	F37g	F37 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board		64	35
	F37h	F37 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	-	65	38
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

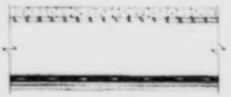
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Wood Floor Trusses (wood framing members not less than 38 mm x 89 mm with metal connector plates not less than 1 mm thick with teeth not less than 8 mm in length - minimum 235 mm depth)	F37i	F37 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	–	55	27
	F37j	F37 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board	–	57	29
	F37k	F37 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board		62	34
	F37l	F37 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board		63	37
	F38	• 38 mm concrete topping (at least 70 kg/m^2) • subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on wood trusses spaced not more than 600 mm o.c. • with or without absorptive material in cavity • resilient metal channels spaced 400 mm or 600 mm o.c. • 2 layers of gypsum board on ceiling side			
	F38a	F38 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum	1 h	64	36
	F38b	F38 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board		65	38
	F38c	F38 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board		69	44
	F38d	F38 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	–	70	46
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

Type of Assembly	Assembly Number	Description	Fire-Resistance Rating$^{(4)(5)(6)(7)}$	Typical Sound Transmission Class$^{(4)(5)(8)(9)}$ (STC)	Typical Impact Insulation Class$^{(4)(8)(10)}$ (IIC)
Floors and Ceilings					
Wood Floor Trusses (wood framing members not less than 38 mm x 89 mm with metal connector plates not less than 1 mm thick with teeth not less than 8 mm in length - minimum 235 mm depth)	F38e	F38 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	45 min	64	36
	F38f	F38 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	-	65	38
	F38g	F38 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board		69	44
	F38h	F38 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board		70	46
	F38i	F38 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	-	62	34
	F38j	F38 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board	-	63	35
	F38k	F38 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board		67	42
	F38l	F38 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board		68	43
Cold Formed Steel Floor Joists (minimum 41 mm x 203 mm x 1.22 mm)	**F39**	• subfloor of 15.5 mm plywood, OSB or waferboard or 17 mm tongue and groove lumber • on steel joists spaced not more than 600 mm o.c. • with or without absorptive material in cavity • 1 layer of gypsum board on ceiling side			
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

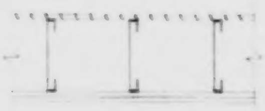
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating[(4)(5)(6)(7)]	Typical Sound Transmission Class[(4)(5)(8)(9)] (STC)	Typical Impact Insulation Class[(4)(8)(10)] (IIC)
Floors and Ceilings					
Cold Formed Steel Floor Joists (minimum 41 mm x 203 mm x 1.22 mm)	F39a	F39 with • no absorptive material in cavity • 15.9 mm Type X gypsum board		33	28
	F39b	F39 with • absorptive material in cavity • 15.9 mm Type X gypsum board	–	34	30
	F39c	F39 with • no absorptive material in cavity • 12.7 mm Type X gypsum board	–	32	27
	F39d	F39 with • absorptive material in cavity • 12.7 mm Type X gypsum board	–	33	29
	F39e	F39 with • no absorptive material in cavity • 12.7 mm regular gypsum board	–	31	26
	F39f	F39 with • absorptive material in cavity • 12.7 mm regular gypsum board	–	32	28
	F40	• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on steel joists spaced not more than 600 mm o.c. • with or without absorptive material in cavity • 2 layers of gypsum board on ceiling side			
	F40a	F40 with • no absorptive material in cavity • 15.9 mm Type X gypsum board		36	31
	F40b	F40 with • absorptive material in cavity • 15.9 mm Type X gypsum board	–	37	33
	F40c	F40 with • no absorptive material in cavity • 12.7 mm Type X gypsum board	–	35	30
	F40d	F40 with • absorptive material in cavity • 12.7 mm Type X gypsum board	–	36	32
	F40e	F40 with • no absorptive material in cavity • 12.7 mm regular gypsum board	–	34	29
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

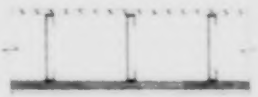
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Cold Formed Steel Floor Joists (minimum 41 mm x 203 mm x 1.22 mm)	F40f	F40 with • absorptive material in cavity • 12.7 mm regular gypsum board		35	31
	F41	• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on steel joists spaced not more than 600 mm o.c. • with or without absorptive material in cavity • metal furring channels spaced 400 mm or 600 mm o.c. • 1 layer of gypsum board on ceiling side			
	F41a	F41 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum		38	31
	F41b	F41 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board		39	32
	F41c	F41 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board	30 min [45 min](13)	41	34
	F41d	F41 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	30 min [45 min](13)	42	35
	F41e	F41 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board		37	30
	F41f	F41 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board		38	31
	F41g	F41 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	30 min [45 min](13)	40	33
	F41h	F41 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	30 min [45 min](13)	41	34
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Cold Formed Steel Floor Joists (minimum 41 mm x 203 mm x 1.22 mm)	F41i	F41 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	< 30 min	35	29
	F41j	F41 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board	< 30 min	37	30
	F41k	F41 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	< 30 min	39	32
	F41l	F41 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board	< 30 min	40	33
	F42	• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on steel joists spaced not more than 600 mm o.c. • with or without absorptive material in cavity • resilient metal channels spaced 400 mm or 600 mm o.c. • 1 layer of gypsum board on ceiling side			
	F42a	F42 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum	1 h	41	34
	F42b	F42 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	1 h	42	35
	F42c	F42 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board	1 h	44	37
	F42d	F42 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	1 h	45	38
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

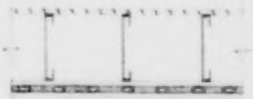
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Cold Formed Steel Floor Joists (minimum 41 mm × 203 mm × 1.22 mm)	F42e	F42 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	1 h	40	33
	F42f	F42 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	1 h	41	34
	F42g	F42 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	1 h	43	36
	F42h	F42 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	1 h	44	37
	F42i	F42 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	–	39	32
	F42j	F42 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board		40	33
	F42k	F42 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board		42	35
	F42l	F42 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board	–	43	36
	F43	• subfloor of 15.5 mm plywood, OSB or waferboard or 17 mm tongue and groove lumber • on steel joists spaced not more than 600 mm o.c. • with or without absorptive material in cavity • 1 layer of gypsum board attached directly to joists on ceiling side • resilient metal channels spaced 400 mm or 600 mm o.c. attached to joists through the gypsum board • 1 layer of gypsum board attached to resilient channels			
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

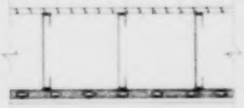
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
		Floors and Ceilings			
Cold Formed Steel Floor Joists (minimum 41 mm x 203 mm x 1.22 mm)	F43a	F43 with • no absorptive material in cavity • 15.9 mm Type X gypsum board • resilient metal channels • 15.9 mm Type X gypsum board	1 h	35	27
	F43b	F43 with • absorptive material in cavity • 15.9 mm Type X gypsum board • resilient metal channels • 15.9 mm Type X gypsum board	1 h	37	30
	F43c	F43 with • no absorptive material in cavity • 12.7 mm Type X gypsum board • resilient metal channels • 12.7 mm Type X gypsum board	1 h	35	27
	F43d	F43 with • absorptive material in cavity • 12.7 mm Type X gypsum board • resilient metal channels • 12.7 mm Type X gypsum board	1 h	37	30
	F43e	F43 with • no absorptive material in cavity • 12.7 mm regular gypsum board • resilient metal channels • 12.7 mm regular gypsum board		32	26
	F43f	F43 with • absorptive material in cavity • 12.7 mm regular gypsum board • resilient metal channels • 12.7 mm regular gypsum board	-	35	28
	F44	• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on steel joists spaced not more than 600 mm o.c. • with or without absorptive material in cavity • resilient metal channels spaced 400 mm or 600 mm o.c. • 1 layer of gypsum board on ceiling side			
	F44a	F44 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum		39	32
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(7)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Cold Formed Steel Floor Joists (minimum 41 mm x 203 mm x 1.22 mm)	F44b	F44 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	–	41	34
	F44c	F44 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board	30 min [45 min](13)	48(9)	40
	F44d	F44 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	30 min [45 min](13)	49(9)	42
	F44e	F44 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board		39	32
	F44f	F44 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board		41	34
	F44g	F44 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	30 min [45 min](13)	48(9)	39
	F44h	F44 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	30 min [45 min](13)	49(9)	42
	F44i	F44 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	< 30 min	37	31
	F44j	F44 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board	< 30 min	39	33
	F44k	F44 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	< 30 min	45	37
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

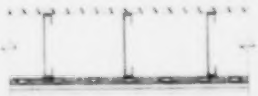
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating[illegible]	Typical Sound Transmission Class[illegible] (STC)	Typical Impact Insulation Class[illegible] (IIC)
Floors and Ceilings					
Cold Formed Steel Floor Joists (minimum 41 mm x 203 mm x 1.22 mm)	F44l	F44 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board	< 30 min	47	40
	F45	• subfloor of 15.5 mm plywood, OSB or waferboard or 17 mm tongue and groove lumber • on steel joists spaced not more than 600 mm o.c. • with or without absorptive material in cavity • resilient metal channels spaced 400 mm or 600 mm o.c. • 2 layers of gypsum board on ceiling side			
	F45a	F45 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum	1 h	47	38
	F45b	F45 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	1 h	48[illegible]	40
	F45c	F45 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board	1 h	54	47
	F45d	F45 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	1 h	55	49
	F45e	F45 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	1 h	47	38
	F45f	F45 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	1 h	48[illegible]	40
	F45g	F45 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	1 h	54	47
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Cold Formed Steel Floor Joists (minimum 41 mm x 203 mm x 1.22 mm)	F45h	F45 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	1 h	55	49
	F45i	F45 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	—	45	36
	F45j	F45 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board		46	37
	F45k	F45 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board		52	45
	F45l	F45 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board	—	53	46
	F46	• one subfloor layer of 11 mm sanded plywood, or OSB or waferboard • one subfloor layer of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on steel joists spaced not more than 600 mm o.c. • with or without absorptive material in cavity • resilient metal channels spaced 400 mm or 600 mm o.c. • 1 layer of gypsum board on ceiling side			
	F46a	F46 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum		41	34
	F46b	F46 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board		42	35
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Cold Formed Steel Floor Joists (minimum 41 mm x 203 mm x 1.22 mm)	F46c	F46 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board	-	50	43
	F46d	F46 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	-	51	44
	F46e	F46 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board		41	34
	F46f	F46 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board		42	35
	F46g	F46 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	-	50	43
	F46h	F46 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	-	51	44
	F46i	F46 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board		40	32
	F46j	F46 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board		41	33
	F46k	F46 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	-	48[illegible]	40
	F46l	F46 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board		49[illegible]	41
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

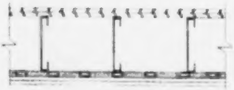
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Cold Formed Steel Floor Joists (minimum 41 mm x 203 mm x 1.22 mm)	**F47**	• one subfloor layer of 11 mm sanded plywood, or OSB or waferboard • one subfloor layer of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on steel joists spaced not more than 600 mm o.c. • with or without absorptive material in cavity • resilient metal channels spaced 400 mm or 600 mm o.c. • 2 layers of gypsum board on ceiling side			
	F47a	F47 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum	1 h	50	41
	F47b	F47 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c • 15.9 mm Type X gypsum board	1 h	51	42
	F47c	F47 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board	1 h	57	50
	F47d	F47 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	1 h	58	51
	F47e	F47 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	1 h	50	41
	F47f	F47 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	1 h	51	42
	F47g	F47 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	1 h	57	50
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

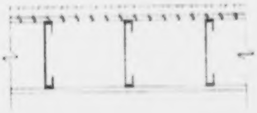
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating[4][5][6][7]	Typical Sound Transmission Class[4][5][8][9] (STC)	Typical Impact Insulation Class[4][8][10] (IIC)
Floors and Ceilings					
Cold Formed Steel Floor Joists (minimum 41 mm x 203 mm x 1.22 mm)	F47h	F47 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	1 h	58	51
	F47i	F47 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	–	46	39
	F47j	F47 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board	–	47	41
	F47k	F47 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	–	53	46
	F47l	F47 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board	–	54	47
	F48	• 25 mm gypsum-concrete topping (at least 44 kg/m^2) • subfloor of 12.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on steel joists spaced not more than 600 mm o.c. • with or without absorptive material in cavity • 1 layer of gypsum board on ceiling side			
	F48a	F48 with • no absorptive material in cavity • 15.9 mm Type X gypsum board	–	39	26
	F48b	F48 with • absorptive material in cavity • 15.9 mm Type X gypsum board	–	40	28
	F48c	F48 with • no absorptive material in cavity • 12.7 mm Type X gypsum board	–	39	26
	F48d	F48 with • absorptive material in cavity • 12.7 mm Type X gypsum board	–	40	28
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

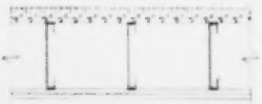
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Cold Formed Steel Floor Joists (minimum 41 mm x 203 mm x 1.22 mm)	F48e	F48 with • no absorptive material in cavity • 12.7 mm regular gypsum board	-	36	25
	F48f	F48 with • absorptive material in cavity • 12.7 mm regular gypsum board	-	38	26
	F49	• 25 mm gypsum-concrete topping (at least 44 kg/m^2) • subfloor of 12.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on steel joists spaced not more than 600 mm o.c. • with or without absorptive material in cavity • 2 layers of gypsum board on ceiling side			
	F49a	F49 with • no absorptive material in cavity • 15.9 mm Type X gypsum board		41	30
	F49b	F49 with • absorptive material in cavity • 15.9 mm Type X gypsum board		43	32
	F49c	F49 with • no absorptive material in cavity • 12.7 mm Type X gypsum board		41	30
	F49d	F49 with • absorptive material in cavity • 12.7 mm Type X gypsum board		43	32
	F49e	F49 with • no absorptive material in cavity • 12.7 mm regular gypsum board	-	38	29
	F49f	F49 with • absorptive material in cavity • 12.7 mm regular gypsum board	-	40	30
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

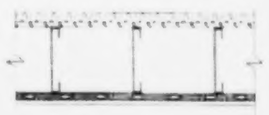
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating[4][5][6][7]	Typical Sound Transmission Class[4][5][8][9] (STC)	Typical Impact Insulation Class[4][8][10] (IIC)
Floors and Ceilings					
Cold Formed Steel Floor Joists (minimum 41 mm x 203 mm x 1.22 mm)	**F50**	• 25 mm gypsum-concrete topping (at least 44 kg/m²) • subfloor of 12.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on steel joists spaced not more than 600 mm o.c. • with or without absorptive material in cavity • resilient metal channels spaced 400 mm or 600 mm o.c. • 1 layer of gypsum board on ceiling side			
	F50a	F50 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum	–	51	20
	F50b	F50 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	–	53	22
	F50c	F50 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board	–	57	24
	F50d	F50 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	–	58	26
	F50e	F50 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	–	51	20
	F50f	F50 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	–	53	22
	F50g	F50 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board		57	24
	F50h	F50 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board		58	26
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

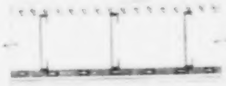
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Cold Formed Steel Floor Joists (minimum 41 mm x 203 mm x 1.22 mm)	F50i	F50 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	–	49(9)	19
	F50j	F50 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board	–	51	21
	F50k	F50 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board		54	22
	F50l	F50 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board		55	24
	F51	• 25 mm gypsum-concrete topping (at least 44 kg/m²) • subfloor of 12.5 mm plywood, OSB or waferboard or 17 mm tongue and groove lumber • on steel joists spaced not more than 600 mm o.c. • with or without absorptive material in cavity • resilient metal channels spaced 400 mm or 600 mm o.c. • 2 layers of gypsum board on ceiling side			
	F51a	F51 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum	1 h	55	26
	F51b	F51 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	1 h	57	28
	F51c	F51 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board	1 h	61	30
	F51d	F51 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	30 min [45 min](11)	62	32
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Cold Formed Steel Floor Joists (minimum 41 mm x 203 mm x 1.22 mm)	F51e	F51 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	1 h	55	26
	F51f	F51 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	1 h	57	28
	F51g	F51 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	1 h	61	30
	F51h	F51 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	45 min [1 h][13]	62	32
	F51i	F51 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	–	53	25
	F51j	F51 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board	–	55	27
	F51k	F51 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board		58	28
	F51l	F51 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board		59	30
	F52	• 38 mm concrete topping (at least 70 kg/m²) • subfloor of 12.5 mm plywood, OSB or waferboard or 17 mm tongue and groove lumber • on steel joists spaced not more than 600 mm o.c. • 1 layer of gypsum board on ceiling side			
	F52a	F52 with • no absorptive material in cavity • 15.9 mm Type X gypsum board		46	25
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

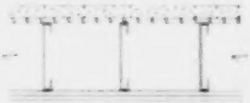
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(9)(10) (IIC)
Floors and Ceilings					
Cold Formed Steel Floor Joists (minimum 41 mm x 203 mm x 1.22 mm)	F52b	F52 with • absorptive material in cavity • 15.9 mm Type X gypsum board		48(7)	28
	F52c	F52 with • no absorptive material in cavity • 12.7 mm Type X gypsum board	–	46	25
	F52d	F52 with • absorptive material in cavity • 12.7 mm Type X gypsum board	–	48(7)	28
	F52e	F52 with • no absorptive material in cavity • 12.7 mm regular gypsum board	–	42	24
	F52f	F52 with • absorptive material in cavity • 12.7 mm regular gypsum board	–	44	25
	F53	• 38 mm concrete topping (at least 70 kg/m²) • subfloor of 12.5 mm plywood, OSB or waferboard or 17 mm tongue and groove lumber • on steel joists spaced not more than 600 mm o.c. • 2 layers of gypsum board on ceiling side			
	F53a	F53 with • no absorptive material in cavity • 15.9 mm Type X gypsum board		47	30
	F53b	F53 with • absorptive material in cavity • 15.9 mm Type X gypsum board		49	32
	F53c	F53 with • no absorptive material in cavity • 12.7 mm Type X gypsum board		47	30
	F53d	F53 with • absorptive material in cavity • 12.7 mm Type X gypsum board		49	32
	F53e	F53 with • no absorptive material in cavity • 12.7 mm regular gypsum board		43	29
	F53f	F53 with • absorptive material in cavity • 12.7 mm regular gypsum board		45	30
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

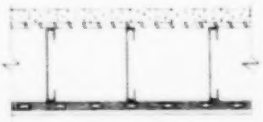
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Cold Formed Steel Floor Joists (minimum 41 mm x 203 mm x 1.22 mm)	**F54**	• 38 mm concrete topping (at least 70 kg/m^2) • subfloor of 12.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on steel joists spaced not more than 600 mm o.c. • with or without absorptive material in cavity • resilient metal channels spaced 400 mm or 600 mm o.c. • 1 layer of gypsum board on ceiling side			
	F54a	F54 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum	-	57	28
	F54b	F54 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	-	59	30
	F54c	F54 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board		64	35
	F54d	F54 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board		65	38
	F54e	F54 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	-	57	28
	F54f	F54 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board		59	30
	F54g	F54 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board		64	35
	F54h	F54 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board		65	38
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

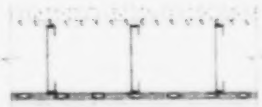
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Cold Formed Steel Floor Joists (minimum 41 mm x 203 mm x 1.22 mm)	F54i	F54 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	-	55	27
	F54j	F54 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board	-	57	29
	F54k	F54 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board		62	34
	F54l	F54 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board		63	37
	F55	• 38 mm concrete topping (at least 70 kg/m²) • subfloor of 12.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber • on steel joists spaced not more than 600 mm o.c. • with or without absorptive material in cavity • resilient metal channels spaced 400 mm or 600 mm o.c. • 2 layers of gypsum board on ceiling side			
	F55a	F55 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum	1 h	64	36
	F55b	F55 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	1 h	65	38
	F55c	F55 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board	1 h	69	44
	F55d	F55 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	45 min [1 h](12)	70	46
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

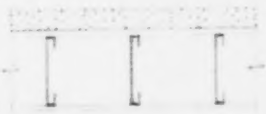
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Cold Formed Steel Floor Joists (minimum 41 mm x 203 mm x 1.22 mm)	F55e	F55 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	1 h	64	36
	F55f	F55 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	1 h	65	38
	F55g	F55 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	1 h	69	44
	F55h	F55 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	45 min [1 h](13)	70	46
	F55i	F55 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	–	62	34
	F55j	F55 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board	–	63	35
	F55k	F55 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board		67	42
	F55l	F55 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board		68	43
	F56	• 50 mm concrete • 0.46 mm metal pan with a 19 mm rib • on steel joists spaced not more than 600 mm o.c. • 1 layer of gypsum board on ceiling side			
	F56a	F56 with • no absorptive material in cavity • 15.9 mm Type X gypsum board		46	25
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

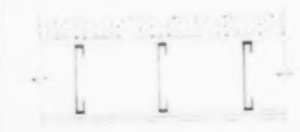
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating[4][5][6][7]	Typical Sound Transmission Class[4][5][8][9] (STC)	Typical Impact Insulation Class[4][8][10] (IIC)
Floors and Ceilings					
Cold Formed Steel Floor Joists (minimum 41 mm x 203 mm x 1.22 mm)	F56b	F56 with • absorptive material in cavity • 15.9 mm Type X gypsum board		48	28
	F56c	F56 with • no absorptive material in cavity • 12.7 mm Type X gypsum board	-	46	25
	F56d	F56 with • absorptive material in cavity • 12.7 mm Type X gypsum board	-	48	28
	F56e	F56 with • no absorptive material in cavity • 12.7 mm regular gypsum board	-	42	24
	F56f	F56 with • absorptive material in cavity • 12.7 mm regular gypsum board	-	44	25
	F57	• 50 mm concrete • 0.46 mm metal pan with a 19 mm rib • on steel joists spaced not more than 600 mm o.c. • 2 layers of gypsum board on ceiling side			
	F57a	F57 with • no absorptive material in cavity • 15.9 mm Type X gypsum board		47	30
	F57b	F57 with • absorptive material in cavity • 15.9 mm Type X gypsum board		49[illegible]	32
	F57c	F57 with • no absorptive material in cavity • 12.7 mm Type X gypsum board	-	47	30
	F57d	F57 with • absorptive material in cavity • 12.7 mm Type X gypsum board	-	49[illegible]	32
	F57e	F57 with • no absorptive material in cavity • 12.7 mm regular gypsum board	-	43	29
	F57f	F57 with • absorptive material in cavity • 12.7 mm regular gypsum board	-	45	30
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

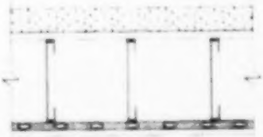
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Cold Formed Steel Floor Joists (minimum 41 mm x 203 mm x 1.22 mm)	**F58**	• 50 mm concrete • 0.46 mm metal pan with a 19 mm rib • on steel joists spaced not more than 600 mm o.c. • with or without absorptive material in cavity • resilient metal channels spaced 400 mm or 600 mm o.c. • 1 layer of gypsum board on ceiling side			
	F58a	F58 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum	–	57	28
	F58b	F58 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board		59	30
	F58c	F58 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board		64	35
	F58d	F58 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	–	65	38
	F58e	F58 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board		57	28
	F58f	F58 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board		59	30
	F58g	F58 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	–	64	35
	F58h	F58 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	–	65	38
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

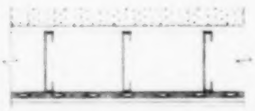
Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Cold Formed Steel Floor Joists (minimum 41 mm x 203 mm x 1.22 mm)	F58i	F58 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	–	55	27
	F58j	F58 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board	–	57	29
	F58k	F58 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board		62	34
	F58l	F58 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board		63	37
	F59	• 50 mm concrete • 0.46 mm metal pan with a 19 mm rib • on steel joists spaced not more than 600 mm o.c. • with or without absorptive material in cavity • resilient metal channels spaced 400 mm or 600 mm o.c. • 2 layers of gypsum board on ceiling side			
	F59a	F59 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum	1 h	64	36
	F59b	F59 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	1 h	65	38
	F59c	F59 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board	1 h	69	44
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Floors and Ceilings					
Cold Formed Steel Floor Joists (minimum 41 mm x 203 mm x 1.22 mm)	F59d	F59 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	45 min [1 h](13)	70	46
	F59e	F59 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	1 h	64	36
	F59f	F59 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	1 h	65	38
	F59g	F59 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	1 h	69	44
	F59h	F59 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	45 min [1 h](13)	70	46
	F59i	F59 with • no absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	-	62	34
	F59j	F59 with • no absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board	-	63	35
	F59k	F59 with • absorptive material in cavity • metal furring channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	-	67	42
	F59l	F59 with • absorptive material in cavity • metal furring channels spaced 600 mm o.c. • 12.7 mm regular gypsum board	-	68	43
Column 1	2	3	4	5	6

Table 2 (Cont'd)
Fire and Sound Resistance of Floors, Ceilings and Roofs

Type of Assembly	Assembly Number	Description	Fire-Resistance Rating(4)(5)(6)(7)	Typical Sound Transmission Class(4)(5)(8)(9) (STC)	Typical Impact Insulation Class(4)(8)(10) (IIC)
Roofs					
Wood Roof Trusses	**R1**	• wood roof trusses(4) spaced not more than 600 mm o.c. • 1 layer 15.9 mm Type X gypsum board(3)	45 min	–	–
Roofs - Rating Provided by Membrane Only					
	M1	• supporting members spaced not more than 600 mm o.c. • 1 layer 15.9 mm Type X gypsum board	30 min	–	–
	M2	• supporting members spaced not more than 600 mm o.c. • 2 layers 15.9 mm Type X gypsum board	1 h	–	–
Column 1	2	3	4	5	6

Notes to Table 2:

(1) For systems with a ceiling of a single layer of gypsum board on resilient channels, the resilient channel arrangement at the gypsum board butt end joints is to be as shown in Figure 1.

(2) For systems with a ceiling of 2 layers of gypsum board on resilient channels, the fastener and resilient channel arrangement at the gypsum board butt end joints are to be as shown in Figure 2.

(3) STC values given are for the minimum thickness of subfloor as shown. Minimum subfloor thickness required is determined by joist or truss spacing - see Table 9.23.14.5.A. of Division B. Thicker subflooring is also acceptable.

(4) Sound absorptive material includes fibre processed from rock, slag, or glass, or cellulose fibre either loose-fill or spray-applied. To obtain the listed STC rating, the nominal insulation thickness is 150 mm for rock, slag, or glass fibres or loose-fill cellulose fibre, and 90 mm for spray-applied cellulose fibre. Absorptive material will affect the STC by approximately adding or subtracting 1 per 50 mm change of thickness.

(5) The fire and sound ratings are based on the spacing of ceiling supports as noted. A narrower spacing will be detrimental to the sound rating but not to the fire rating.

(6) Type and spacing of fasteners shall be in accordance with Subsection 9.29.5 of Division B or CSA A82.31-M:
  (i) fastener distance to board edges and butt ends shall be no less than 38 mm, except for fasteners on the butt ends of the base layer in ceilings with two layers (see Figure 2); and
  (ii) fasteners shall not be spaced more than 300 mm o.c.

(7) See Sentence 1.2.1.(2) in Supplementary Standard SB-2 for the significance of fire-resistance ratings.

(8) STC values given are for depth of framing member noted. For shallower members, subtract 1 from the STC for each 50 mm reduction in framing depth. For framing members deeper than noted, add 1 to the STC for each 50 mm increase in framing depth.

(9) STC values given reflect results for joist spacing of at least 400 mm o.c. unless otherwise specified. For joist spacing of at least 600 mm o.c., add 2 to the STC values given in the Table.

(10) IIC values given are for floors tested with no finished flooring.

(11) The fire rating value within square brackets is achieved only where absorptive material includes:
  (i) fibre processed from rock or slag with a thickness of 90 mm and 2.8 kg/m^2; or
  (ii) cellulose fibre spray-applied with a minimum depth of 90 mm on the underside of the deck and 90 mm on the sides of the floor joists, and a minimum density of 50 kg/m^3.

(12) The fire-resistance rating values given only apply to systems with solid wood joists spaced not more than 400 mm o.c. No information is available on wood I-joists for these cases.

(13) The fire rating value within square brackets is achieved only where absorptive material includes fibre processed from rock or slag with a thickness of 90 mm and 2.8 kg/m^2.

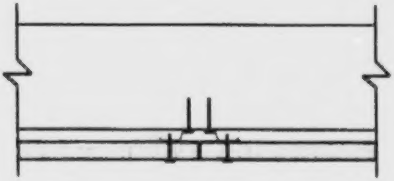


Figure 1
Single Layer Butt Joint Details

Notes to Figure 1:

(1) Figure is for illustration purposes only and is not to scale.
(2) The structural member can be any one of the types described in the Table.
(3) Adjacent gypsum board butt ends are to be attached to separate resilient channels using regular Type S screws, located a minimum of 38 mm from the butt end.

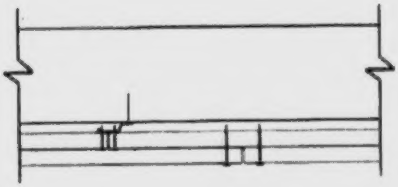


Figure 2
Double Layer Butt Joint Details

Notes to Figure 2:

(1) Figure is for illustration purposes only and is not to scale.
(2) The structural member can be any one of the types described in the Table.
(3) Base layer butt ends can be attached to a single resilient channel using regular Type S screws.
(4) Type G screws measuring a minimum of 32 mm in length and located a minimum of 38 mm from the butt end are to be used to fasten the butt ends of the face layer to the base layer.

Ministry of Municipal Affairs and Housing
Building and Development Branch

Ontario

Supplementary Standard SB-4

Measures for Fire Safety in High Buildings

August 15, 2006

Supplementary Standard SB-4

COMMENCEMENT

Supplementary Standard SB-4 comes into force on the 31st day of December, 2006.

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SB-4 Measures for Fire Safety in High Buildings

(This Supplementary Standard is based in large measure on the Supplement to the National Building Code of Canada 1990 and from Appendix B of the National Building Code of Canada 2005)

Introduction

Experience has shown that the time required for the complete evacuation of a high building can exceed that which is considered necessary for the safe egress of all occupants. Studies of the "chimney effect" and observations of smoke movement in fires have shown that present measures for containing a fire on a lower storey will not usually prevent the movement of smoke through the elevator, stair or other vertical shafts to the upper storeys of a high building. Occupants of high buildings, and particularly those on upper storeys, may be faced with severe smoke conditions from fires occurring in storeys below them before their own evacuation is possible.

The measures described in this Standard are designed to implement the requirements of Subsection 3.2.6. of Division B in the 2006 Building Code by providing safe conditions for the occupants of a high building who may have to remain in the building during a fire, by protecting exit routes and by assisting fire fighters with the provision of efficient access to the fire floor.

The knowledge requirements of these measures are well within the capabilities of the competent designer. The designer should appreciate, however, that the successful application of the measures requires a clear understanding of the principles that govern smoke movement, as well as an awareness of the assumptions on which the measures are based. The assumptions regarding building characteristics associated with each measure are included in the text. If the building under consideration has characteristics that are significantly different from these, appropriate adjustments must be made to the design.

This is particularly true of methods employing air-handling systems where, for example, a realistic assessment of the leakage characteristics of the enclosures of spaces into which air is introduced may be critical. In this context, special attention is drawn to the building pressurization approach used in conjunction with a smoke shaft. The recommendations contained in this Supplementary Standard for this approach were developed assuming a building with fairly uniform leakage characteristics. Where a building departs substantially from this model, the design must be adjusted to compensate. An example of the latter condition would be a building which contains at the lower levels a large shopping complex of much greater floor area than at the higher levels.

The designer is cautioned that the tabular and graphical information presented herein have been developed for buildings having the characteristics listed in this document. It will be for the designer to judge the extent to which the building under consideration has characteristics that will allow the application of this information. This is particularly important where a designer intends to develop an original smoke control approach.

The 2006 Building Code requires that a check be made of the smoke control system when requested by the authority having jurisdiction in accordance with the procedures described in Appendix C of this Supplementary Standard. This check will indicate deficiencies caused by inexact estimates of the leakage characteristics or of air supply requirements and, in all but the most extreme cases, will provide an opportunity for appropriate adjustments before the system is put into service.

Section 1 Scope of Measures for Fire Safety in High Buildings

This Supplementary Standard includes a number of detailed measures that may be incorporated in a building in order to comply with the requirements relating to control of smoke that are included in Subsection 3.2.6. of Division B. It is not the intention to exclude other means of attaining the same objectives. Where smoke control methods other than those described in this Supplementary Standard are developed, they may be based on the information in Appendix B of this Supplementary Standard.

Smoke control measures required by Subsection 3.2.6. of Division B vary depending on the height and occupancy of a building. In a sprinklered building, the requirements for control of smoke movement are minimal (see Measure A, Section 2). In very tall buildings, limits are placed on the penetration of smoke into exit stairs, elevators for fire fighters and all floor areas other than the one on which fire occurs. Such limits are achieved by Measures B, D, F, H and I in Section 2. In certain buildings of lesser height and limited population, exit stairs and elevators for fire fighters are protected and smoke may be expected to enter upper floor areas. This situation applies where Measures C, E, G and J, described in Section 2, are employed. In other buildings, the spread of smoke into shafts and floor areas is accepted, but areas of refuge are provided that are maintained smoke free, that can be reached by all people in the building within a few minutes and that are linked to outdoors by safe means of egress. They are described in Measures K and L in Section 2.

Where Measures A, B, D, F, H and I in Section 2 are applied, it is assumed that in the event of fire occupants of the floor on which the fire occurs will leave by exit stairs immediately following the sounding of a fire alarm, and that occupants of the floor immediately above the floor on which the fire occurs will be advised to leave by the first fire department officer on the scene or other person assigned this responsibility. Occupants of all other floors may remain on their floors unless otherwise directed.

Where Measures C, E, G and J in Section 2 are applied, it is assumed that occupants of all floors will move immediately into the stairshafts and will then proceed slowly to the outdoors following the sounding of a general fire alarm.

Where Measure K in Section 2 is applied (i.e. the building is divided vertically into two zones), it is assumed that occupants of the floor on which the fire originates will leave by exit stairs, and that the occupants of all other floors in the zone in which the fire is discovered will move through vestibules or bridges to floor areas on the same level in the fire-free smoke control region immediately following the sounding of a fire alarm. Occupants may remain in these areas of refuge until further directed by the fire department officer.

Where Measure L in Section 2 is applied, it is assumed that occupants of the floor on which the fire originates will leave by the exit stairs, and that occupants of all other floors will move by corridors or stairs to areas of refuge that are distributed throughout the building immediately following the sounding of the fire alarm. Occupants may remain in these areas of refuge until otherwise directed.

In a residential building where reliance is placed on balconies as places of refuge from smoke, as described in Measure M in Section 2, occupants may remain in their suites when a general fire alarm is given, but should be prepared to move on to their balconies if conditions in the suite should become untenable.

It is assumed that the cumulative population of storeys below grade divided by 1.8 times the width in metres of all exit stairs at the storey under consideration will not exceed the 300 limit referred to in Article 3.2.6.1. of Division B, and that occupants of storeys below grade will evacuate the building by the stairshafts immediately after the discovery of a fire in a storey below grade.

It is also important that fire fighters are provided with a smoke-free access to fire floors below grade. Measures A, B, C, D, E, F, G, L and M include provisions designed to separate the exit stairs serving storeys above grade from those serving storeys below grade, and to limit entry of smoke into these shafts. Elevator shafts and service shafts are required to be provided with a separation near grade, or be designed to limit their functioning as paths of smoke movement into upper floor areas. In Measures H, I and J, no special precautions are necessary to protect shafts in storeys below grade, because the system of pressurization plus venting of the fire floor protects all shafts, whether or not these penetrate storeys below grade. In Measure K, the separation into two zones is maintained in storeys below grade. Smoke-free access will thus be available to any floor on which the fire occurs.

Synopsis of Measures for Fire Safety in High Buildings

Each of the measures is illustrated by a sketch with notes describing the applicable conditions (Figures 1 to 18). These sketches are intended as a guide to the detailed requirements and as an aid to finding the relative clauses, but they are not intended to limit in any way the scope of the detailed provisions which in general provide a wider range of choice than can be shown in the sketches and notes. A summary of requirements applicable to all buildings, regardless of the measure being used, is given in the following paragraph.

Requirements Common to all Measures for Fire Safety in High Buildings

(1) Elevators controlled by keyed switch (Article 3.2.6.8. of Division B).

(2) Elevator for fire fighters required (Article 3.2.6.9. of Division B).

(3) Means of venting each floor area to outdoors by smokeshaft, windows or building exhaust system (Article 3.2.6.10. of Division B).

(4) Certain floor areas in the building to be sprinklered (Articles 3.2.1.5. and 3.2.2.15. of Division B).

(5) Limits on flame-spread rating and smoke developed classification for interior finish materials in certain locations (Article 3.1.13.7. of Division B).

(6) Central alarm and control facility required (Article 3.2.6.12. of Division B).

(7) Voice communication system required if building is more than 36 m high (Article 3.2.6.13. of Division B).

(8) Fire protection required for electrical feeders to emergency equipment (Article 3.2.7.10. of Division B).

(9) Power to operate emergency lighting, fire alarm and voice communication systems (Article 3.2.7.8 of Division B).

(10) Emergency power to operate elevators required if building is more than 36 m high (Article 3.2.7.9. of Division B).

Measure A Fully Sprinklered Building

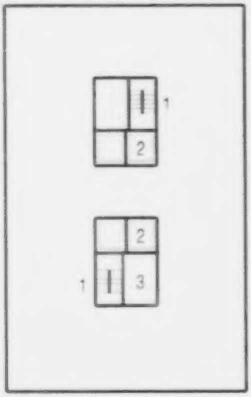

Figure 1 Typical floor plan, Measure A

Measure A satisfies Sentence 3.2.6.4.(1) of Division B for any major occupancy classification.

No limit on height.

All floor areas sprinklered (Sentence 3.2.6.4.(1) of Division B).

Limits on flame-spread ratings and smoke developed classifications described in Sentence 3.1.13.7.(1) of Division B are relaxed (Sentence 3.1.13.7.(2) of Division B).

1. Door to outdoors in each stairshaft held open during a fire emergency (2A(2))*
   Stairshaft serving floors below the lowest exit level is separate from stairshaft serving floors above that storey (2A(3)).
   Stairshaft serving floors below the lowest exit level is pressurized during a fire emergency (2A(3)).

2. Elevator shaft terminates not lower than the first floor below the lowest exit storey or has elevator vestibules in every storey below the lowest exit storey (2A(5)).

3. Vertical service spaces, other than elevator shafts, provided with firestops at the first floor below the lowest exit storey or vented to outdoors at top during a fire emergency (2A(6)).

   Air moving fans are stopped during a fire emergency in a system that serves more than two storeys (Sentence 3.2.6.4.(1) of Division B).

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* First number indicates Section number. Letter indicates Measure. Last number indicates number of Sentence in that Measure.

Measure B Open Corridor Access to Stairs and Elevators (including restrictions on movement of smoke from floor to floor)

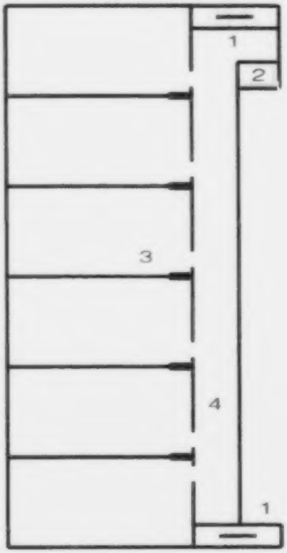

Figure 2 Typical floor plan, Measure B

Measure B satisfies Sentences 3.2.6.2.(2) to (4) of Division B for any major occupancy classification.

No limit on height.

1. Stairshaft serving floors below the lowest exit level is separate from stairshaft serving floors above that storey (2B(3)).*
   Stairshaft serving floors below the lowest exit level is pressurized during a fire emergency (2B(3)).

2. Elevator shaft terminates not lower than the first floor below the lowest exit storey or has elevator vestibules in every storey below the lowest exit storey (2B(4)).

3. Vertical service spaces, other than elevator shafts, provided with firestops at the first floor below the lowest exit storey and at intervals of not more than five storeys or vented to outdoors at top during a fire emergency (2B(5)).

4. Open corridor or balcony providing access to stairs and elevator for fire fighters (2B(2)).
   Elevator shaft and stairshaft heating restrictions.
   Air moving fans are stopped during a fire emergency in a system that serves more than two storeys (2B(6)).
   Certain dampers close in air handling ducts during a fire emergency (2B(8)).

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* First number indicates Section number. Letter indicates Measure. Last number indicates number of Sentence in that Measure.

Measure C Open Corridor Access to Stairs and Elevators (no additional restrictions on movement of smoke from floor to floor)

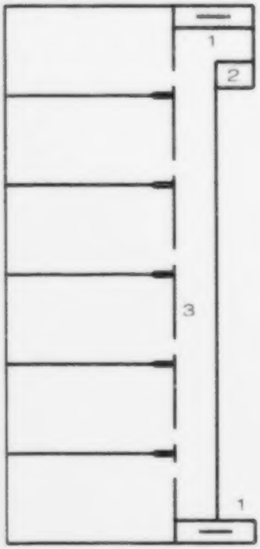

Figure 3 Typical floor plan, Measure C

Measure C satisfies Sentence 3.2.6.5.(1) of Division B for Group A, C, D, E or F major occupancy classification.

Limit on population (Sentence 3.2.6.5.(1) of Division B).

Limited to buildings not more than 75 m high (Sentence 3.2.6.5.(1) of Division B).

1. Stairshaft serving floors below the lowest exit level is separate from stairshaft serving floors above that storey (2C(3)).*
   Stairshaft serving floors below the lowest exit level is pressurized during a fire emergency (2C(3)).

2. Elevator shaft terminates not lower than the first floor below the lowest exit storey or has elevator vestibules in every storey below the lowest exit storey (2C(4)).

3. Open corridor or balcony providing access to stairs and elevator for fire fighters (2C(2)).
   Elevator shaft and stairshaft heating restrictions.
   Air moving fans are stopped during a fire emergency in a system that serves more than two storeys (2C(5)).

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* First number indicates Section number. Letter indicates Measure. Last number indicates number of Sentence in that Measure.

Measure D Protected Vestibule Access to Stairs and Elevators (including restrictions on movement of smoke from floor to floor)

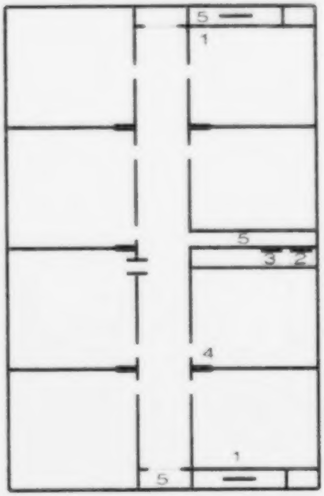

Figure 4 Typical floor plan, Measure D

Measure D satisfies Sentences 3.2.6.2.(2) to (4) of Division B for any major occupancy classification.

No limit on height.

1. Door to outdoors in each stairshaft held open during a fire emergency (2D(7)).*
   Stairshaft serving floors below the lowest exit level is separate from stairshaft serving floors above that level (2D(8)).
   Stairshaft serving floors below the lowest exit level is pressurized during a fire emergency (2D(8)).

2. Elevator shaft terminates not lower than the first floor below the lowest exit storey or has elevator vestibules in every storey below the lowest exit storey (2D(13)).

3. Shaft containing an elevator for fire fighters is provided with vent to outdoors at bottom during a fire emergency if the vestibule protection is by pressurization (2D(9)).

4. Vertical service spaces, other than elevator shafts, provided with firestops at the first floor below the lowest exit storey and at intervals of not more than five storeys or vented to outdoors at top during a fire emergency (2D(11)).
5. Vestibule vented to outdoors during a fire emergency or pressurized (2D(5)).

   Vents to vestibules openable from central control facility if building is more than 36 m high (2D(6)).
   Air moving fans are stopped during a fire emergency in a system that serves more than two storeys (2D(14)).
   Certain dampers close in air handling ducts during a fire emergency (2D(15)).

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* First number indicates Section number. Letter indicates Measure. Last number indicates number of Sentence in that Measure.

Measure E Protected Vestibule Access to Stairs and Elevators (no additional restrictions on movement of smoke from floor to floor)

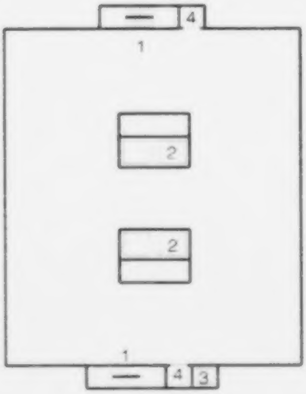

Figure 5 Typical floor plan, Measure E

Measure E satisfies Sentence 3.2.6.5.(1) of Division B for Group A, C, D, E or F major occupancy classification.

Limit on population (Sentence 3.2.6.5.(1) of Division B).

Limited to buildings not more than 75 m high (Sentence 3.2.6.5.(1) of Division B).

1. Door to outdoors in each stairshaft held open during a fire emergency (2E(6)).*
   Stairshaft serving floors below the lowest exit level is separate from stairshaft serving floors above that level (2E(7)).
   Stairshaft serving floors below the lowest exit level is pressurized during a fire emergency (2E(7)).

2. Elevator shaft terminates not lower than the first floor below the lowest exit storey or has elevator vestibules in every storey below the lowest exit storey (2E(10)).
   No special protection against smoke for elevator shafts or vertical service spaces other than a shaft containing an elevator for fire fighters.

3. Shaft containing an elevator for fire fighters is provided with vent to outdoors at bottom during a fire emergency (2E(8)).

4. Vestibule vented to outdoors during a fire emergency or pressurized (2E(4)).
   Vents to vestibules openable from central control facility if building is more than 36 m high (2E(5)).
   Air moving fans are stopped during a fire emergency in a system that serves more than two storeys (2E(11)).

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* First number indicates Section number. Letter indicates Measure. Last number indicates number of Sentence in that Measure.

Measure F Pressurized Stairshafts and Elevator Shafts (including restrictions on movement of smoke from floor to floor)

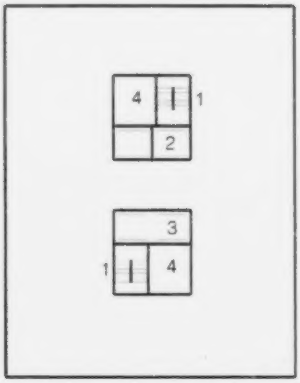

Figure 6 Typical floor plan, Measure F

Measure F satisfies Sentences 3.2.6.2.(2) to (4) of Division B for any major occupancy classification.

No limit on height.

1. Door to outdoors in each stairshaft held open during a fire emergency (2F(2)).*
   Stairshaft pressurized during a fire emergency (2F(2)).
   Stairshaft serving floors below the lowest exit level is separate from stairshaft serving floors above that level (2F(3)).
   Stairshaft serving floors below the lowest exit level is pressurized during a fire emergency (2F(3)).

2. Shaft containing an elevator for fire fighters is pressurized during a fire emergency (2F(4)).

3. Vertical service spaces, other than elevator shafts, provided with firestops at the first floor below the lowest exit storey and at intervals of not more than five storeys or vented to outdoors at top during a fire emergency (2F(7)).
   Air moving fans are stopped during a fire emergency in a system that serves more than two storeys (2F(11)).
   Certain dampers in air-handling ducts close during a fire emergency (2F(12)).

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* First number indicates Section number. Letter indicates Measure. Last number indicates number of Sentence in that Measure.

Measure G Pressurized Stairshafts and Elevator Shafts (no additional restrictions on movement of smoke from floor to floor)

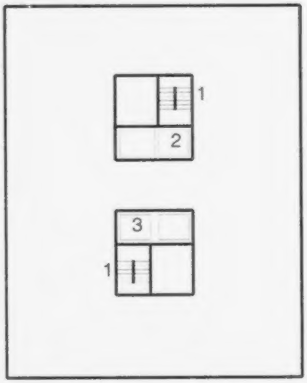

Figure 7 Typical floor plan, Measure G

Measure G satisfies Sentence 3.2.6.5.(1) of Division B for Group A, C, D, E or F major occupancy classification.

Limit on population (Sentence 3.2.6.5.(1) of Division B).

Limited to buildings not more than 75 m high (Sentence 3.2.6.5.(1) of Division B).

1. Door to outdoors in each stairshaft held open during a fire emergency (2G(2)).*
   Stairshaft pressurized during a fire emergency (2G(2)).
   Stairshaft serving floors below the lowest exit level is separate from stairshaft serving floors above that level (2G(3)).
   Stairshaft serving floors below the lowest exit level is pressurized during a fire emergency (2G(3)).

2. Shaft containing an elevator for fire fighters is pressurized during a fire emergency (2G(4)).

3. No special protection against smoke for elevator shafts or vertical service spaces other than a shaft containing an elevator for fire fighters.
   Air moving fans are stopped during a fire emergency in a system that serves more than two storeys (2G(7)).

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Measure H Building Fully Pressurized

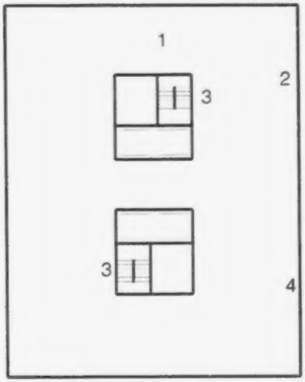

Figure 8 Typical floor plan, Measure H

Measure H satisfies Sentences 3.2.6.2.(2) to (4) of Division B for any major occupancy classification.

No limit on height

1. All floor areas pressurized during a fire emergency (2H(2)).*
   Provision for modulating air supply for building pressurization during warm weather (2H(4)).

2. Fire floor provided with means of venting to outdoors by smokeshaft or windows (2H(7)).

3. A proportion of air for building pressurization directed into stairshafts (2H(2)).
   Doors to outdoors in stairshafts not held open during a fire emergency (2H(5)).

4. Except as required for venting, all openings in perimeter walls and roof are kept closed during a fire emergency (2H(5)).
   Except as required for pressurization, air moving fans are stopped during a fire emergency in a system that serves more than two storeys (2H(4)).
   Certain dampers in air handling ducts are closed during a fire emergency (2H(6)).

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Measure I Partially Pressurized Building (including restrictions on movement of smoke from floor to floor outside core)

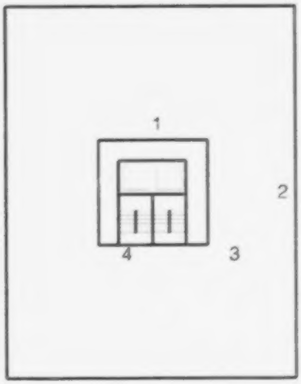

Figure 9 Typical floor plan, Measure I

Measure I satisfies Sentences 3.2.6.2.(2) to (4) of Division B for any major occupancy classification.

No limit on height.

1. Enclosing wall of core is a fire separation with self closing doors.
   Central core is pressurized during a fire emergency (2I(2)).*
   All openings in perimeter walls and roof of core kept closed during a fire emergency (2I(3)).

2. Fire compartment is vented to outdoors during a fire emergency by smokeshaft or windows (2I(4)).

3. Vertical service spaces, other than elevator shafts, outside core provided with firestops at the level of the first floor below the lowest exit storey and at intervals of not more than five storeys or vented to outdoors at the top during a fire emergency (2I(6)).

4. Doors to outdoors in stairshafts not held open during a fire emergency except as required for pressurizing the core (2I(3)).
   Air moving fans are stopped during a fire emergency in a system that serves more than two storeys (2I(7)).
   Certain dampers in air handling ducts are closed during a fire emergency (2I(8)).

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Measure J Partially Pressurized Building (no additional restrictions on movement of smoke from floor to floor outside core)

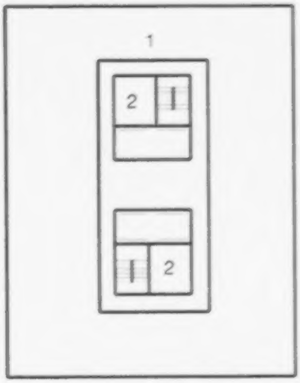

Figure 10 Typical floor plan, Measure J

Measure J satisfies Sentence 3.2.6.5.(1) of Division B for Group A, C, D, E or F major occupancy classification.

Limit on population (Sentence 3.2.6.5.(1) of Division B).

Limited to buildings not more than 75 m high (Sentence 3.2.6.5.(1) of Division B).

1. Enclosing wall of core is a fire separation with self closing doors.
   Central core is pressurized during a fire emergency (2J(2)).*
   All openings in perimeter walls and roof of core are kept closed during a fire emergency (2J(3)).

2. Doors to outdoors in stairshafts not held open during a fire emergency (2J(3)).
   Air moving fans are stopped during a fire emergency in a system that serves more than two storeys (2J(4))

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Measure K Vertically Divided Building (with spatial separation)

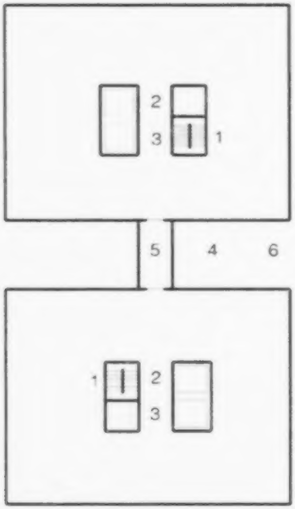

Figure 11 Typical floor plan, Measure K

Measure K satisfies for Sentence 3.2.6.3.(1) of Division B for buildings of Group A, C, D, E or F major occupancy classification.

No limit on height.

1. Door to outdoors in each stairshaft held open during a fire emergency (2K(13)).*

2. One elevator for fire fighters and one stairshaft in each smoke control region (2K(4)).

3. If bridges do not occur at each storey, two stairshafts are required in each smoke control region (Sentence 3.4.2.1. of Division B).

4. Building designed as two smoke control regions with spatial separation between (2K(2)).

5. Bridges at intervals of not more than five storeys, except that in buildings of Group C major occupancy more than 75 m high, the bridge is at each storey (2K(3)).
   Bridges vented to outdoors or pressurized during a fire emergency (2K(11)).

6. Fire separation in storeys below grade to maintain separation between smoke control regions (2K(15)).
   Air moving fans are stopped during a fire emergency in a system that serves more than two storeys (2K(14)).

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Measure K Vertically Divided Buildings (with fire separation)

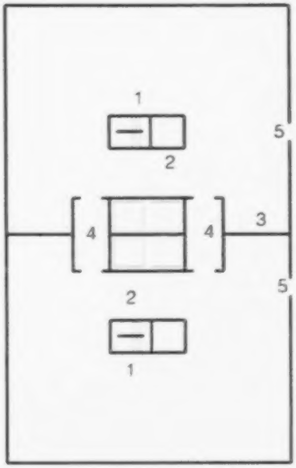

Figure 12 Typical floor plan, Measure K

Measure K satisfies Sentence 3.2.6.3.(1) of Division B for buildings of Group A, C, D, E or F major occupancy classification.

No limit on height.

1. Door to outdoors in each stairshaft held open during a fire emergency (2K(13))*.

2. One elevator for fire fighters and one stairshaft in each smoke control region (2K(4)).
   If vestibules do not occur at each storey, two stairshafts are required in each smoke control region (Sentence 3.4.2.1. of Division B).

3. Building designed as two smoke control regions with fire separation between (2K(2)).
   Fire separation in storeys below grade to maintain separation between smoke control regions (2K(15)).

4. Vestibule at intervals of not more than five storeys, except that in the case of buildings of Group C major occupancy more than 75 m high, the vestibule is at each storey (2K(3)).
   Vestibules vented to outdoors or pressurized during a fire emergency (2K(11)).

5. Vent to outdoors in each smoke control region on floors below mid height of building (2K(12)).
   Air moving fans are stopped during a fire emergency in a system that serves more than two storeys (2K(14)).

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Measure L Areas of Refuge (duplicate groups of areas of refuge at every fifth storey except as required in item 5)

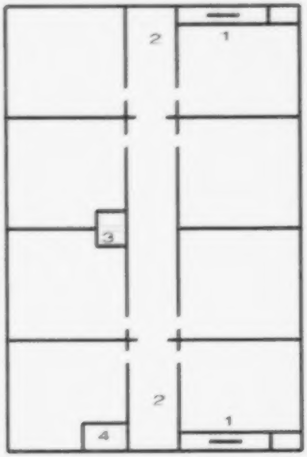

Figure 13 Typical floor plan, Measure L

Measure L satisfies Sentence 3.2.6.3.(1) of Division B for buildings of Group A, C, D, E or F major occupancy classification.

No limit on height.

1. Stairshaft and shaft containing an elevator for fire fighters protected by area of refuge or vestibule (2L(11)).*
   Door to outdoors in each stairshaft held open during a fire emergency (2L(14)).*
   Stairshaft serving floors below the lowest exit level is separate from stairshaft serving floors above that storey (2L(15)).
   Stairshaft serving floors below the lowest exit level is pressurized during a fire emergency (2L(15)).

2. Stairshaft and shaft containing an elevator for fire fighters is protected at intermediate floors by pressurized vestibules (2L(11)).

3. Shaft containing an elevator for fire fighters terminates not lower than the first floor below the lowest exit storey or has elevator vestibules in every storey below the lowest exit storey (2L(13)).
   Shaft containing an elevator for fire fighters provided with vent to outdoors at bottom during a fire emergency (2L(16)).

4. No special protection against smoke for elevator shafts or vertical service spaces other than a shaft containing an elevator for fire fighters.

5. Two areas of refuge on each fifth floor pressurized during a fire emergency (2L(10)), or areas of refuge staggered on intermediate storeys (see Figure 15), except that in buildings of Group C major occupancy more than 75 m high the areas of refuge shall be located on each storey.
   Air moving fans are stopped during a fire emergency in a system that serves more than two storeys (2L(18)).

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* First number indicates Section number. Letter indicates Measure. Last number indicates number of Sentence in that Measure.

Measure L Areas of Refuge (areas of refuge located in pairs)

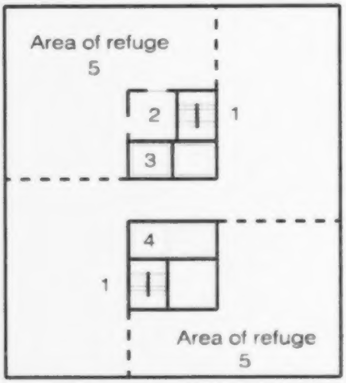

Figure 14 Typical floor plan, Measure L

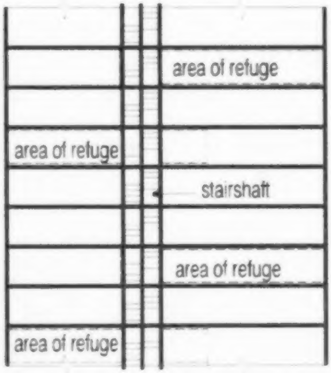

Figure 15 Typical cross section showing areas of refuge on intermediate floors

Measure L satisfies Sentence 3.2.6.3.(1) of Division B for buildings of Group A, C, D, E or F major occupancy classification.

No limit on height.

1. Stairshaft and shaft containing an elevator for fire fighters protected by area of refuge or vestibule (2L(11)).*
   Door to outdoors in each stairshaft held open during a fire emergency (2L(14)).
   Stairshaft serving floors below the lowest exit level is separate from stairshaft serving floors above that storey (2L(15)).
   Stairshaft serving floors below the lowest exit level is pressurized during a fire emergency (2L(15)).

2. Two areas of refuge are pressurized during a fire emergency (see Figure 14 for area of refuge every fifth storey), except that in buildings of Group C major occupancy more than 75 m high, the areas of refuge are located on each storey (2L(10)).

3. No special protection against smoke for elevator shafts or vertical service spaces other than a shaft containing an elevator for fire fighters.

4. Shaft containing an elevator for fire fighters terminates not lower than the first floor below the lowest exit storey or has elevator vestibules in every storey below the lowest exit storey (2L(13)).
   Shaft containing an elevator for fire fighters is provided with vent to outdoors at bottom during a fire emergency (2L(16))
   Air moving fans are stopped during a fire emergency in a system that serves more than two storeys (2L(18)).

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Measure M Building with Balconies

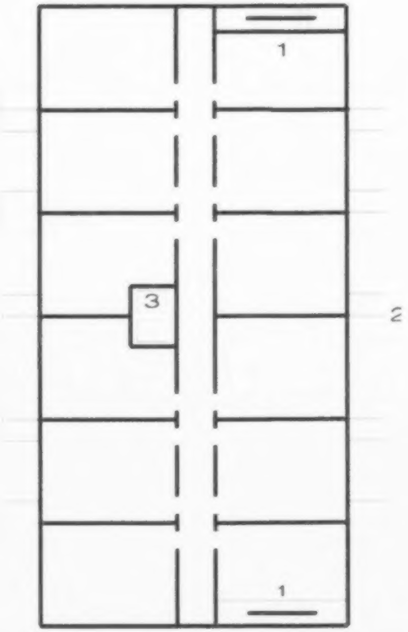

Figure 16 Typical floor plan, Measure M

Measure M satisfies Sentence 3.2.6.6.(1) of Division B for buildings of Group C major occupancy classification.

1. Door to outdoors in each stairshaft held open during a fire emergency (2M(2)).*
   Stairshaft serving floors below the lowest exit level is separate from stairshaft serving floors above that level (2M(3)).
   Stairshaft serving floors below the lowest exit level is pressurized during a fire emergency (2M(3)).

2. Each suite is provided with a balcony (Sentence 3.2.6.6.(1) of Division B).

3. Elevator shaft terminates not lower than the first floor below the lowest exit storey or has elevator vestibules in every storey below the lowest exit storey (2M(4)).
   Air moving fans are stopped during a fire emergency in a system that serves more than two storeys (2M(5)).

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Measure N Connected Buildings

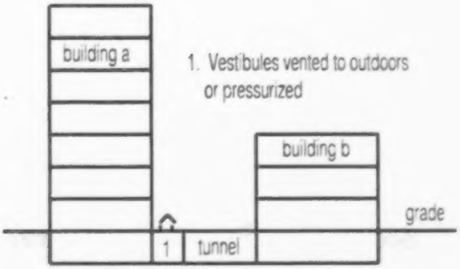

building a
1. Vestibules vented to outdoors or pressurized
building b
grade
1
tunnel

Figure 17 Section through building linked by underground tunnel

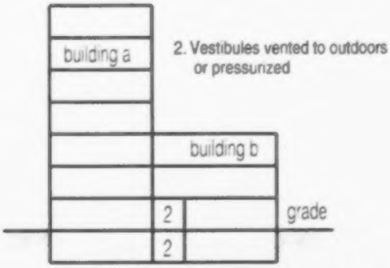

building a
2. Vestibules vented to outdoors or pressurized
building b
grade
2
2

Figure 18 Section through buildings joined at firewall

Measure N satisfies Article 3.2.6.7. of Division B for connected buildings.

Section 2 Measures for Life Safety in High Buildings

Measure A Fully Sprinklered Buildings

General

The steps described in this Measure amount to an adequate smoke control measure, satisfying the requirements of Sentence 3.2.6.4.(1) of Division B. Reliance is placed on the full sprinkler installation to limit fire spread and hence the generation of smoke.

Some additional protection of exit stairs is afforded by the provision of an opening to the outdoors at the foot of the stairshaft. In cold weather, when stack action is likely to be most significant, this measure may give a general increase in air pressure in the stairshaft, thus restricting entry of smoke.

In this Measure is included the requirement that elevator shafts and service shafts should not be continuous from above to below grade, except when vestibules are provided at elevator doors in below grade storeys.

Where Measure A is adopted and a fire is detected by an automatic device or a manual pull station is actuated, it is intended that a fire alarm will sound on all floors simultaneously, and that the occupants of the fire floor will walk downstairs to the street floor or to a safe intermediate floor area. Occupants of other floors may remain where they are until advised to evacuate by the person operating the central alarm and control facility.

Measure A

(1) The requirements of Sentence 3.2.6.4.(1) of Division B may be met by incorporating the requirements in Sentences (2) to (8).

(2) A stairway serving storeys above the lowest exit level has a vent or door to the outdoors at or near the bottom of the stairshaft, as described in Sentence (4).

(3) A stairway serving floors below the lowest exit level
(a) has a vent or door to the outdoors at or near the top of the stairshaft that has an openable area of not less than 0.1 m^2 for each storey served by the stairway, less 0.01 m^2 for each weatherstripped door and 0.02 m^2 for each non-weatherstripped door opening into the stairshaft,
(b) is enclosed in a shaft that does not pass through the floor above the lowest exit level and is separate from a shaft that contains a stairway serving upper storeys, or is enclosed in a shaft that contains a stairway serving upper storeys, but is separated from that stairway at the lowest exit level by a fire separation having a fire-resistance rating not less than that required for the shaft enclosure, and
(c) is provided with equipment capable of maintaining a flow of air introduced at or near the bottom of the stairshaft, at a rate equal to 0.47 m^3/s for each storey served by the stairway.

(4) A stairshaft required to be vented to the outdoors by Sentence (2) or by other provisions in this Supplementary Standard is provided with a vent or door that
(a) has an openable area of 0.05 m^2 for every door between the stairshaft and a floor area, but not less than 1.8 m^2,
(b) opens directly to the outdoors or into a vestibule or exit corridor that has a similar opening to the outdoors, and
(c) has a door or closure that is openable manually and can remain in this open position during a fire emergency.

(5) Any elevator shaft that passes through the floor above the lowest exit storey does not penetrate the floor of the storey immediately below the lowest exit storey, except where there is a vestibule between the shaft and each floor area below grade as described in Sentence (3) of Measure D.

(6) A vertical service space, other than an elevator shaft, that passes through the floor above the lowest exit storey, is provided with a tight-fitting noncombustible seal or fire stop at the floor level of the storey immediately below that storey, except where the vertical service space is vented to the outdoors at the top as described in Sentence (10) of Measure F.

(7) A supply of air required by Sentence (3) is carried in ducts as described in Sentence (13) of Measure F.

(8) The central control facility required by Article 3.2.6.12. of Division B is provided with additional controls capable of
(a) opening closures to vents in shafts that may be required by Sentence (6),
(b) stopping air handling systems as required by Sentence 3.2.6.4.(1) of Division B, and
(c) initiating the mechanical air supply to stairshafts as may be required in Sentence (3).

Measures B and C Open Corridor Access to Stairs and Elevators

General

Measures B and C can be applied to a building where habitable floor areas are approached along access ways open to the outdoors.

Each corridor that provides access to stairs or elevators is permanently open to the outside as shown in Figures 2 and 19. The situation is illustrated by the pressure characteristic diagram shown in Figure 20. Air flow through openings that may exist in floors is likely to be more pronounced than with other smoke control methods because of the reduction in the influence of vertical shafts, so it is desirable that openings through the floor-ceiling assembly be minimized. This should not, however, present an immediate smoke problem except on the floor directly above the floor where a fire occurs.

Measure C is the same as Measure B, except that no steps are taken to limit smoke movement into upper storeys through vertical service spaces or shafts in Measure C.

Where shafts enclosing plumbing and electrical services penetrate floor spaces and a decision has been made to use Measure B for control of smoke movement, these shafts should be sealed at least at every fifth storey at a horizontal fire separation and at the floor immediately below the lowest exit storey or have vents to the outside at the top. In the latter case there is still some possibility that smoke may pass into the uppermost floor because the air pressures in these floor areas are in the same range as the outside pressures. It is therefore important that any leakage areas in the enclosing walls between floor areas and shaft be kept to a minimum.

In order to avoid creation of pressures that may interfere with the opening of doors to stairshafts and elevator shafts, it is recommended that the building heating system be so designed that temperatures in heated stairshafts and elevator shafts be not more than 12°C above outside air temperature.

Where Measure B is adopted and a fire is detected by an automatic device or a manual pull station is actuated, it is intended that a fire alarm will sound on all floors simultaneously, and that the occupants of the fire floor will walk down stairs to a safe floor area. In buildings more than 36 m high, occupants of other floors may remain until advised to evacuate by the person operating the central alarm and control facility.

Where Measure C is adopted, and a fire is detected by an automatic device or a manual pull station is actuated, it is intended that a fire alarm will sound on all floors simultaneously, and that occupants of all floors will walk down stairs to the street floor or to a safe intermediate floor area.

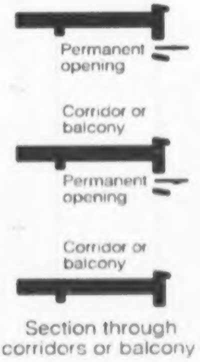


Figure 19 Illustration of Measures B and C designs

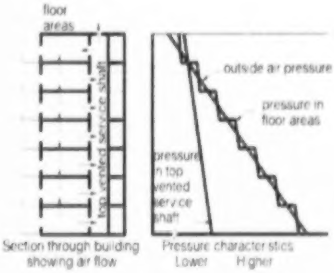


Figure 20 Pressure characteristics in a Measure B design

Measure B (including restriction on the movement of smoke from floor to floor)

(1) The requirements of Sentences (1) to (3) of Article 3.2.6.2. of Division B may be met by incorporating the requirements in Sentences (2) to (9).

(2) All public corridors leading to the required exit stairs and elevators for fire fighters from every floor area on a floor above the lowest exit storey are provided with permanent openings to the outdoors that
(a) are distributed along the length of the corridor,
(b) have the top of the opening not more than 250 mm below the ceiling of the corridor, and
(c) have an aggregate open area that is not less than 10 per cent of the floor area of the corridor or 1 m^2, whichever is greater.

(3) A stairway serving storeys below the lowest exit level is protected as described in Sentence (3) of Measure A.

(4) Any elevator shaft that passes through the floor above the lowest exit storey does not penetrate the floor of the storey immediately below the lowest exit storey except where there is a vestibule between the elevator door or doors and each floor area below grade as described in Sentence (3) of Measure D.

(5) A vertical service space, other than an elevator shaft, within a heated floor area is provided with
(a) tight-fitting noncombustible fire stops located at the level of the floor immediately below the lowest exit storey and at the level of certain other floors that are fire separations provided the space between fire stops is not more than five storeys, or
(b) a vent to the outdoors as described in Sentence (10) of Measure F.

(6) Except for exhaust from kitchens, washrooms and bathrooms in dwelling units, air moving fans are stopped during a fire emergency in an air handling system that serves more than two storeys.

(7) Supply, return and exhaust ducts more than 0.013 m^2 in cross-sectional area at the point of entry to a vertical service space in an air handling system that is required to shut down by the provisions of Sentence (6) are provided with dampers that will close when the air moving fans are stopped.

(8) Where a supply of air is required by the provisions of Sentence (3), it is carried in ducts as described in Sentence (13) of Measure F.

(9) The central alarm and control facility required by Article 3.2.6.12. of Division B is provided with additional controls that are capable of
(a) stopping the air handling systems and closing dampers as required by Sentences (6) and (7),
(b) opening closures to vents in vertical service spaces where required by Sentence (5), and
(c) initiating the air supply to stairshafts as may be required by Sentence (3).

Measure C (no restriction on the movement of smoke from floor to floor)

(1) The requirements of Sentences (2) and (3) of Article 3.2.6.2. of Division B may be met by incorporating the requirements of Sentences (2) to (7).

(2) The public corridors leading to the required exit stairs and elevators for fire fighters from every floor area on a floor above the storey on which egress directly to the outdoors occurs are provided with permanent openings to the outdoors that
(a) are distributed along the length of the corridor,
(b) have the top of the opening not more than 250 mm below the ceiling of the corridor, and
(c) have an aggregate open area that is not less than 10 per cent of the floor area of the corridor or 1 m^2, whichever is greater.

(3) A stairway serving storeys below the lowest exit level is protected as described in Sentence (3) of Measure A.

(4) Any elevator shaft that contains an elevator for fire fighters and passes through the floor above the lowest exit storey does not penetrate the floor of the storey immediately below the lowest exit storey except where there is a vestibule between the elevator door or doors and each floor area below grade as described in Sentence (3) of Measure D.

(5) Except for exhaust from kitchens, washrooms and bathrooms in dwelling units, air moving fans are stopped during a fire emergency in an air handling system that serves more than two storeys.

(6) Where a supply of air is required by Sentence (3), it is carried in ducts described in Sentence (13) of Measure F.

(7) The central alarm and control facility required by Article 3.2.6.12. of Division B is provided with additional controls that are capable of
(a) stopping the air handling systems as required by Sentence (5), and
(b) initiating the air supply to stairshafts as may be required by Sentence (3).

Measures D and E Protected Vestibule Access to Stairshafts and Elevator Shafts

General

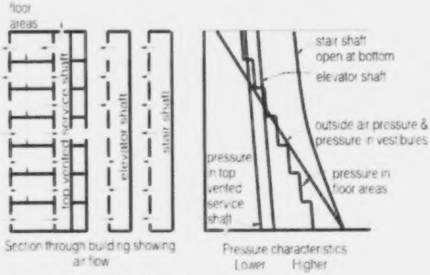
In Measures D and E, movement of smoke through stairshafts and elevator shafts is limited by the provision of vestibules that are either open to the outdoors during a fire emergency or have outdoor air injected into them. Stairshafts are further protected by opening a door to the outdoors at the bottom of the shaft. Where vestibules are protected by the injection of outdoor air, the elevator shaft is provided with a large opening to the outdoors at the bottom.

Where Article 3.2.6.2. of Division B requires the movement of smoke into floor areas to be limited, service shafts are either sealed at intervals or provided with an opening to the outdoors at the top of the shaft as described in Measure B. A typical plan of a building in which this method of smoke control is appropriate is shown in Figure 4.

Measure E is the same as Measure D, except that no measures are taken to limit movement of smoke into upper storeys in Measure E.

Where a vestibule has a vent or opening to the outdoors that is much larger than the leakage area around doors between the vestibule and other parts of the building, the air pressure in the vestibule will be approximately equal to the outdoor pressure at the same level. This is illustrated in Figure 7. In cold weather in storeys below the neutral pressure plane, air pressure in the vestibule will be substantially higher than that in the floor area. Air will tend to flow from the vestibule into the floor area. In upper storeys the air pressure in the vestibules will be less than that in the floor area, and air will flow from the floor area to the vestibule. The vent or opening at the foot of the stairshaft referred to above has the effect of increasing pressure in the shaft, so that it approaches outdoor air pressure at ground level (see Figure 21). On upper storeys the pressure in the stairshaft will be higher than that in the vestibules, and smoke that may enter the vestibules will not pass into the stairshaft.

In warm weather when outdoor air may be as warm or warmer than that inside a building, the stack effect is likely to be minimal. In these circumstances, the major problem is expansion of the hot gases on the fire floor. This will tend to force air around doors into the vestibule. The large vent opening, however, will create a situation where the greater proportion of the air entering the vestibule will pass to the outdoors and a much smaller quantity may enter the shafts. The effect of wind is variable and difficult to predict. In warm weather the effect may be to protect vestibules on one side of the building and to allow smoke to enter those on the other side.


floor areas
top vented service shaft
elevator shaft
stair shaft
stair shaft open at bottom
elevator shaft
outside air pressure & pressure in vestibules
pressure in top vented service shaft
pressure in floor areas
Section through building showing air flow
Pressure characteristics
Lower Higher

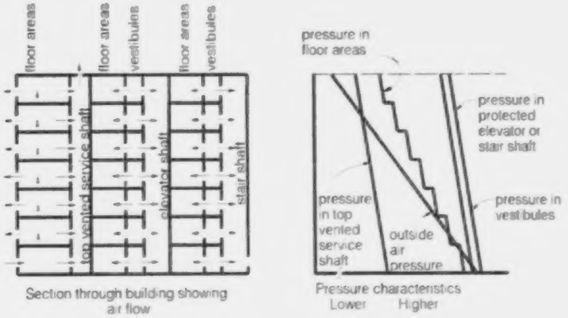
Elevator and stair shafts are shown separate because access from floor area to shaft is by a vestibule open to exterior

Figure 21 Pressure characteristics in a Measure D building with vented shafts

Where air is injected into vestibules, the pressure characteristics in cold weather are likely to be as shown in Figure 22. The rates of air injection should be sufficient to keep the pressures in the vestibules a little higher than the pressure in the shaft. This limits the possibility of movement of smoke into the vestibules from the floor areas. In cold weather vents at the bottom of the stairshafts and elevator shafts provide additional protection.

Service shafts that will not be used in a fire emergency are provided with vents at the top to the outdoors where Measure D (but not Measure E) requires that movement of smoke into upper floors be limited. However, some smoke may pass from top vented service shafts into the top floor or floors, because air pressures at the top of the shafts and in the floor area of the top storey are approximately equal.

Stack action and the operation of smoke control measures may provide pressures that will interfere with the normal operation of certain doors. Where a vestibule is vented to the outdoors, this may apply to any door between a vestibule and an elevator shaft that is farther above or below the mid-height of a building than the height given by Graph 8 in Appendix A of this Supplementary Standard and to any door between a vestibule and a stairshaft that is farther above grade than the height given by Graph 8. Where a vestibule is pressurized, this may apply to any door between a vestibule and a floor space that is farther above grade than the height shown in Graph 8.



Section through building showing air flow

Pressure characteristics
Lower Higher

Figure 22 Pressure characteristics in a Measure D building having air injected into vestibules

As an alternative to the provision of a mechanical air supply for a vestibule to an elevator shaft, as described in Sentence (5) of Measure D, the mechanical air supply can be introduced directly into the shaft as described in Sentence (4) of Measure F provided there are no open vents to the elevator shaft as described in Sentence (9) of Measure D.

Where a mechanical air supply is required by Sentence (5) of Measure D and Sentence (4) of Measure E, it may be desirable to heat the air supply and to provide two air intakes in separate locations on the building face as discussed in the general provisions to Measures F and G.

Where Measure D is adopted, and a fire is detected by an automatic device or a manual pull station is actuated, it is intended that a fire alarm will sound on all floors simultaneously, and that the occupants of the fire floor will walk down stairs to the street floor or to a safe intermediate floor area. Occupants of other floors may remain until advised to evacuate by the person operating the central alarm and control facility.

Where Measure E is adopted, and a fire is detected by an automatic device or a manual pull station is actuated, it is intended that a fire alarm will sound on all floors simultaneously, and that occupants of all floors will walk down stairs to the street floor or to a safe intermediate floor area.

Measure D (including restriction on the movement of smoke from floor to floor)

(1) The requirements of Sentences (1) to (3) of Article 3.2.6.2. of Division B may be met by incorporating the requirements of Sentences (2) to (17).

(2) Between each floor area and each stair shaft or elevator shaft that contains an elevator for fire fighters, a vestibule is provided as described in Sentence (3).

(3) Where a vestibule is required by Sentence (2) or by other provisions of this document
(a) a fire separation is provided between a public corridor and the vestibule that has a fire-resistance rating of not less than 45 min,
(b) a fire separation is provided between a floor area, other than the corridor described in Clause (a), and the vestibule that has a fire-resistance rating not less than that required for an exit in Article 3.4.4.1. of Division B,
(c) a fire separation is provided between a stair or elevator enclosure and the vestibule that has a fire-resistance rating not less than that required for an exit in Article 3.4.4.1. of Division B, and
(d) a door in the fire separation described in Clauses (a), (b) or (c) (except for an elevator door) is provided with a self-closing device as required by Subsection 3.1.8. of Division B, and opens in the direction of travel from the floor area to the exit stairway.

(4) On each floor any vestibule that has a door to an exit stair may also have a door to an elevator for fire fighters, but two exit stairs may not open onto the same vestibule.

(5) Each vestibule described in Sentence (2) that provides access to a stairshaft or an elevator shaft
(a) has a vent opening to the outdoors that has an opening area not less than 0.1 m^2 for each door that opens onto the vestibule, but not less than 0.4 m^2, or
(b) has equipment capable of providing for a vestibule to a stairshaft or an elevator shaft a mechanical air supply not less than that obtained from Graph 3 in Appendix A of this Supplementary Standard.

(6) The vent to each vestibule referred to in Clause (5)(a) may be provided with a closure that is openable manually, and in a building that is more than 36 m high, it can be opened from the central control facility as provided in Sentence (17).

(7) A stairway serving storeys above the lowest exit level is vented to the outdoors at the bottom of the stairshaft as described in Sentence (4) of Measure A.

(8) A stairway serving storeys below the lowest exit level is protected as described in Sentence (3) of Measure A.

(9) Each elevator shaft protected by a vestibule having a mechanical air supply as described in Clause (5)(b) has a vent at or near the bottom of the shaft, opening directly to the outdoors or into a vestibule or corridor that has a similar opening to the outdoors, having an openable area not less than 0.02 m^2 for every door into the shaft, other than doors at street floor level.

(10) The vent at the bottom of an elevator shaft referred to in Sentence (9) may be provided with a closure which is openable manually and is designed to remain open during a fire emergency.

(11) A vertical service space other than an elevator shaft is provided with
(a) a tight-fitting noncombustible fire stop at the level of the floor immediately below the lowest exit storey, and at the level of certain other floors that are fire separations, provided the space between fire stops is not more than five storeys, or
(b) a vent to the outdoors as described in Sentence (10) of Measure F.

(12) Except as provided in Sentence (13), an elevator shaft other than a shaft that contains an elevator for fire fighters is protected against entry of smoke by a vestibule as described in Sentence (5).

(13) The provisions in Sentence (12) are waived for an elevator shaft that serves floor areas below the lowest exit storey and does not penetrate the floor immediately above that storey.

(14) Except for air moving fans supplying vestibules as provided in Clause (5)(b), and except for exhaust from kitchens, washrooms and bathrooms in dwelling units, air moving fans are stopped during a fire emergency in an air handling system that serves more than two storeys.

(15) In an air handling system that is required to shut down by the provisions of Sentence (14), supply, return and exhaust ducts more than 130 cm^2 in cross-sectional area at the point of entry to a vertical service space are provided at that point with dampers that will close when air moving fans are stopped.

(16) Where a supply of air is required by the provisions of Sentences (5) and (8), it is carried in ducts described in Sentence (13) of Measure F.

(17) The central alarm and control facility required by Article 3.2.6.12. of Division B is provided with additional controls that are capable of
(a) opening closures to vents to the outdoors in vestibules on all floors as required by Sentence (6), and in elevator shafts as required by Sentence (9),
(b) stopping air handling systems and closing dampers in ducts as required by Sentences (14) and (15).

(c) initiating the mechanical air supply to vestibules required by Clause (5)(b), and
(d) opening closures to vents in vertical service spaces where required by Sentence (11).

Measure E (no restriction on the movement of smoke from floor to floor)

(1) The requirements of Sentences (2) and (3) of Article 3.2.6.2. of Division B may be met by incorporating the requirements in Sentences (2) to (13).

(2) Between each floor area and each stairshaft or each elevator shaft that contains an elevator for fire fighters, a vestibule is provided as described in Sentence (3) of Measure D.

(3) On each floor any vestibule that has a door to an exit stairshaft may also have a door to an elevator for fire fighters, but two exit stairs may not open onto the same vestibule.

(4) Each vestibule described in Sentence (2) that provides access to a stairshaft or an elevator shaft
(a) has a vent opening to the outdoors that has an openable area of not less than 0.1 m^2 for each door that opens onto the vestibule but not less than 0.4 m^2, or
(b) has equipment capable of providing for a vestibule to a stairshaft or an elevator shaft a mechanical air supply not less than that obtained from Graph 3 in Appendix A of this Supplementary Standard.

(5) The vent to each vestibule referred to in Clause (4)(a) is provided with a closure that is openable manually, and in a building that is more than 36 m high can be opened from the central control facility as provided in Sentence (13).

(6) A stairway serving storeys above the lowest exit level is vented to the outdoors at the bottom of the stairshaft as described in Sentence (4) of Measure A.

(7) A stairway serving storeys below the lowest exit level is protected as described in Sentence (3) of Measure A.

(8) Each elevator shaft protected by a vestibule having a mechanical air supply as described in Clause (4)(b) has a vent at or near the bottom of the shaft opening directly to the outdoors, or into a vestibule or corridor that has a similar opening to the outdoors, having an openable area not less than 0.02 m^2 for every door into the shaft other than doors at street floor level.

(9) The vent at the bottom of an elevator shaft referred to in Sentence (8) may be provided with a closure that is openable manually and is designed to remain open during a fire emergency.

(10) Any elevator shaft that contains an elevator for fire fighters and passes through the floor above the lowest exit storey does not penetrate the floor of the storey immediately below the lowest exit storey except where there is a vestibule between the elevator door or doors and each floor area below grade as described in Sentence (3) of Measure D.

(11) Except for air moving fans supplying vestibules as provided in Clause (4)(b), and except for exhaust from kitchens, washrooms and bathrooms in dwelling units, air moving fans are stopped during a fire emergency in an air handling system that serves more than two storeys.

(12) Where a supply of air is required by the provisions of Sentences (4) and (7), it is carried in ducts described in Sentence (13) of Measure F.

(13) The central alarm and control facility required by Article 3.2.6.12. of Division B is provided with additional controls that are capable of
(a) opening closures to vents to the outdoors in vestibules on all floors as required in Sentence (5),
(b) stopping air handling systems as required by Sentence (11), and
(c) initiating the mechanical air supply to vestibules as required by Clause (4)(b).

Measures F and G Pressurized Stairshafts and Elevator Shafts

General

Measures F and G are suitable for use in buildings that have central cores containing elevator shafts and stairshafts and in buildings that have a spine corridor. The objective is to inject sufficient air from outdoors to provide air pressures in stairshafts and in one or more protected elevator shafts that will be at least equal to the outdoor air pressure at ground level. Protected elevator shafts may, in addition, be provided with vestibules on each floor in order to reduce the effect of the large leakage areas around elevator doors, which may otherwise require injection of excessive quantities of air in order to achieve the desired pressurization. An opening to the outdoors at the bottom of each stairshaft is required in conjunction with air injection in order to maintain the desired pressure conditions, though some doors on upper floors may be held open for a time, and to provide for dilution of smoke that may enter the stairshaft. A typical plan of a building where this method of smoke control is appropriate is shown in Figure 6.

Measure G is the same as Measure F, except that no provisions are made in Measure G to limit movement of smoke into upper floors by way of service shafts and unprotected elevator shafts.

Where Article 3.2.6.2. of Division B requires that movement of smoke into floor areas be limited, service shafts, other than elevator shafts, are either sealed at intervals or vented to the outdoors at the top, as described in the general provisions of Measures B and C. This system is, however, likely to be more efficient than that achieved by Measure D, because injection of air into some shafts has the effect of increasing the air pressure in all floor areas. This is illustrated in Figure 23, where the pressure in the floor area of the top storey is greater than that at the top of the vented shaft.

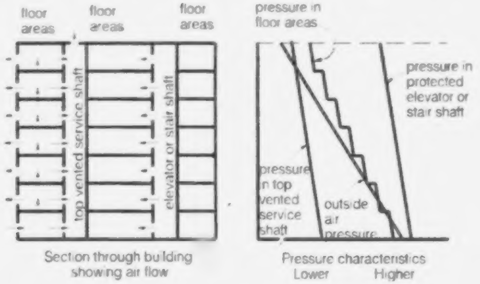


Figure 23 Pressure characteristics in a Measure F building

Treads and landings in a stairshaft present an obstacle to free flow of air. Where air is injected only at the top of a stairshaft, there is likely to be a pressure gradient between the top and the bottom of the stairshaft. This may produce pressure differences of sufficient magnitude to interfere with the opening of doors into the stairshaft in the upper part of the building. This is discussed more fully in Appendix B of this Supplementary Standard.

Stack action and the operation of smoke control measures may produce pressures across certain doors that will interfere with their normal operation. These pressures may affect any door between a floor space and a stairshaft or an elevator vestibule that is farther above grade than the height shown in Graph 8 in Appendix A of this Supplementary Standard.

In order to avoid excessive pressures across doors when outdoor temperatures are appreciably above the January design temperatures, it is recommended that the air flow into elevator shafts in buildings employing Measures F or G be reduced, but not to less than that obtained by the factor $F_s = 5.59$ according to the proportion of the air flow referred to in Sentence (4) of Measure F and Sentence (4) of Measure G. The flow reduction factors are shown in Graph 6 in Appendix A of this Supplementary Standard.

The limits are such that no modulation is required for a building whose maximum height is not more than the value in Column 2 of Table 1, provided the January design temperature is not less than the corresponding value in Column 1.

Table 1
Maximum Height of Building Not Requiring Airflow Modulation

Minimum January Design Temperature, °C	Maximum Height of Building, m
-7	94
-18	70
-29	55
-40	46
Column 1	2

Heating of the air supply referred to in Sentences (2) and (4) of Measure F or Sentences (2) and (4) of Measure G may be necessary, since to maintain the efficiency of the smoke control measures the temperature of the incoming air should be not less than the mean of indoor and outdoor temperatures at the time. To avoid damage to water systems, the temperature of air entering critical locations should be not less than 0°C. To maintain tolerable conditions for occupants, the temperature of air entering occupied spaces should be not less than 10°C.

Where a mechanical air supply is specified in Sentences (2) and (4) of Measure F or Sentences (2) and (4) of Measure G, the air should be drawn from at least two remote locations, each on a different face of the building. Each air intake should be provided with a damper that will close on a signal from a smoke detector in the duct following 30 s exposure to smoke or other products of combustion. The damper should have a manual override to reopen it when the smoke condition that caused it to close has cleared.

Where Measure F is adopted, and a fire is detected by an automatic device or a manual pull station is actuated, it is intended that a fire alarm will sound on all floors simultaneously, and that the occupants of the fire floor will walk down stairs to the street floor or to a safe intermediate floor area. Occupants of other floors may remain until advised to evacuate by the person operating the central alarm and control facility.

Where Measure G is adopted, and a fire is detected by an automatic device or a manual pull station is actuated, it is intended that a fire alarm will sound on all floors simultaneously, and that occupants of all floors will walk down stairs to the street floor.

Measure F (including restriction on the movement of smoke from floor to floor)

(1) The requirements of Sentences (1) to (3) of Article 3.2.6.2. of Division B may be met by incorporating the requirements in Sentences (2) to (14).

(2) A stairshaft serving storeys above the lowest exit level has
(a) a vent or door to the outdoors at or near the lowest exit level of the stairshaft, as described in Sentence (4) of Measure A, except that the vent or door will open when the air supply referred to in Clause (b) is initiated, and
(b) equipment capable of providing to the shaft a mechanical air supply of not less than 4.72 m^3/s plus 0.094 m^3/s for every door opening into the stairshaft.

(3) A stairway serving storeys below the lowest exit level is protected as described in Sentence (3) of Measure A.

(4) An elevator shaft that contains an elevator for fire fighters is provided with equipment capable of maintaining a flow of air to the shaft that is not less than that obtained from Graph 4 in Appendix A of this Supplementary Standard.

(5) Where an elevator shaft referred to in Sentence (4) is provided with a vestibule on every floor, the vestibule enclosure conforms to Sentence (3) of Measure D.

(6) Any elevator shaft that contains an elevator for fire fighters and passes through the floor above the lowest exit storey does not penetrate the floor of the storey immediately below the lowest exit storey, except where each floor area below the lowest exit storey is provided with a vent to the outdoors that
(a) has a net area of not less than 0.2 m^2 for every 1 000 m^2 of floor area,
(b) will remain open during a fire emergency, and
(c) may be incorporated in the conventional exhaust duct system serving storeys below grade.

(7) A vertical service space, other than an elevator shaft, is provided with
(a) a tight-fitting fire stop at the level of the floor immediately below the lowest exit storey and at the level of certain other floors that are fire separations provided the space between fire stops is not more than five storeys, or
(b) a vent to the outdoors as described in Sentence (10).

(8) Except as provided in Sentence (9), an elevator shaft, other than a shaft that contains an elevator for fire fighters, is pressurized as described in Sentence (4).

(9) The provisions of Sentence (8) are waived for an elevator shaft that serves floor areas below the lowest exit storey and does not penetrate the floor immediately above that storey.

(10) Where a vent to the outdoors is required by Sentence (7) or other provisions of this document, the vent
(a) if it is a vertical service space in a building in which other shafts are not mechanically pressurized, has an openable area that is not less than that obtained from Graph 1 in Appendix A of this Supplementary Standard, or if it is in a building in which other shafts are mechanically pressurized, has an openable area that is not less than that obtained from Graph 2 in Appendix A of this Supplementary Standard,
(b) if it is in a shaft serving floor areas above the lowest exit storey, is located at or near the top of the shaft where the top of the shaft is above the mid-height of the building, or at or near the foot of the shaft at or near the exit level where the top of the shaft is below the mid-height of the building,
(c) if it is in a shaft serving floor areas below the lowest exit storey, is located at or near the top of the shaft, and
(d) if it is provided with a closure, is openable both manually and on a signal from a smoke detector located at or near the top of the shaft and by a control device located at the central alarm and control facility referred to in Article 3.2.6.12. of Division B.

(11) Except for air moving fans supplying stairs and elevators as provided in Sentences (2) to (4) and, except for exhaust from kitchens, washrooms and bathrooms in dwelling units, air moving fans in an air handling system that serves more than two storeys are capable of being stopped as provided in Sentence (14).

(12) In an air handling system that is required to shut down by the provisions of Sentence (11), supply, return and exhaust ducts more than 130 cm^2 in cross-sectional area at the point of entry into a vertical service space are provided with dampers that will close when air moving fans are stopped.

(13) Where a supply of air is required by the provisions of Sentences (2), (3) or (4) or by other provisions of this document, the duct system is installed in a service space conforming to Section 3.6. of Division B or is otherwise protected against the effect of fire from the point of fresh air intake to the shaft or to the storey that contains the protected floor area, vestibule or area of refuge that is required to be so protected.

(14) The central alarm and control facility required by Article 3.2.6.12. of Division B is provided with additional controls that are capable of
(a) stopping air handling systems and closing dampers in ducts required in Sentences (11) to (13),
(b) initiating the mechanical air supply to stairshafts and elevator shafts required in Sentences (2) to (4), and
(c) opening closures to vents in vertical spaces where required in Sentence (7).

Measure G (no restriction on the movement of smoke from floor to floor)

(1) The requirements of Sentences (2) and (3) of Article 3.2.6.2. of Division B may be met by incorporating the requirements in Sentences (2) to (9).

(2) A stairshaft serving storeys above the lowest exit level has
(a) a vent or door to the outdoors at or near the lowest exit level of the stairshaft described in Sentence (4) of Measure A, except that the vent or door will open when the air supply referred to in Clause (b) is initiated, and
(b) equipment capable of providing to the stairshaft a mechanical air supply of not less than 4.72 m^3/s, plus 0.094 m^3/s for every door opening into the stairshaft.

(3) A stairway serving storeys below the lowest exit level is protected as described in Sentence (3) of Measure A.

(4) An elevator shaft that contains an elevator for fire fighters is provided with equipment capable of maintaining a flow of air to the shaft that is not less than that obtained from Graph 4 in Appendix A of this Supplementary Standard.

(5) Where an elevator shaft referred to in Sentence (4) is provided with a vestibule on every floor, the vestibule enclosure is as described in Sentence (3) of Measure D.

(6) Any elevator shaft that contains an elevator for fire fighters and passes through the floor above the lowest exit storey does not penetrate the floor of the storey immediately below the lowest exit storey, except where each floor area below the lowest exit storey is provided with a vent to the outdoors that
(a) has a net area of at least 0.2 m^2 for every 1 000 m^2 of floor area,
(b) will remain open during a fire emergency, and
(c) may be incorporated in the conventional exhaust duct system serving storeys below grade.

(7) Except for air moving fans supplying stairshafts and elevator shafts as provided in Sentences (2) to (4) and, except for exhaust from kitchens, washrooms and bathrooms in dwelling units, air moving fans in an air handling system that serves more than two storeys are capable of being stopped as provided in Sentence (9).

(8) Where a supply of air is required by Sentences (2) to (4), it is carried in ducts as described in Sentence (13) of Measure F.

(9) The central alarm and control facility required by Article 3.2.6.12. of Division B is provided with additional controls that are capable of
(a) stopping air handling systems as required by Sentence (7), and
(b) initiating the mechanical air supply to stairshafts and elevator shafts as required by Sentences (2) to (4).

Measure H Fully Pressurized Buildings

General

Measure H is appropriate for buildings having central cores that contain stairshafts and elevator shafts and windows that are not normally opened, as shown in Figure 8. The air pressure in the whole building is increased so that at grade level it is at least equal to outdoor air pressure. When a vent to the outdoors is provided on the fire floor by a window in an exterior wall, by an opening into a smoke shaft as described in Section 3 or by the building mechanical exhaust system if the building is sprinklered, the pressure in the floor area is reduced substantially, as is shown in Figure 24. Air will then flow from the shafts and other floor areas into the fire floor. The combination of building pressurization and venting of the fire floor provides that smoke will not pass into other floor areas or shafts other than the smoke shaft.

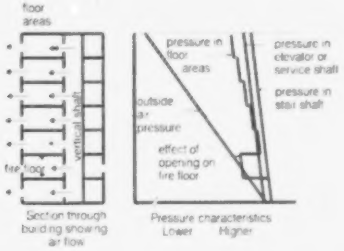


Figure 24 Pressure characteristics in a Measure H building

It is important that air be uniformly distributed throughout the building. This may be achieved by supplying the air through the conventional duct system or through vertical shafts. A minimum proportion of the air is required to be injected directly into stairshafts. This is designed to reduce the possibility, particularly in warm weather, that a substantial drop in pressure will occur in these shafts when a door to the outdoors at grade is opened, with the consequent danger that smoke will enter the shafts.

Where venting is by smoke shafts, the air supply to the floor on which fire occurs should be cut off by closing the dampers on that floor in order not to overload the smoke shaft.

The total air flow for building pressurization is modulated relative to outdoor air temperature. This is intended, in part, to limit the potential pressure drop in stairshafts and elevator shafts referred to above and, in part, to avoid excessive pressures across doors to stairshafts and elevator shafts that would interfere with their normal use.

This requirement for modulation of air flows applies generally to higher buildings. The conditions described in Sentence (3) of Measure H are such that no modulation is required where the January design temperature and the building height are as shown in Table 1.

In Toronto, for example, where the January design temperature is -18°C, no modulation of air flow would be required for a building not more than 70 m high.

This measure is not appropriate for a building where windows may normally be held open. The air flow requirements in Graph 5 in Appendix A of this Supplementary Standard are based on an assumed air leakage through the external walls that is appropriate to modern air-conditioned buildings having reasonably tight-fitting non-openable windows. If the leakage area is other than that noted above, the air flow requirement must be adjusted proportionately, as described in the notes to Graph 5.

Stack action and the operation of smoke control measures may produce pressures across certain doors that will interfere with their normal operation. This may apply to any door between a floor space and stairshaft or an elevator shaft that is farther above grade than the height shown in Graph 8 in Appendix A of this Supplementary Standard.

Where a mechanical air supply is required by Sentence (2) of Measure H, it may be desirable to heat the air supply and to provide two air intakes in separate locations on the building face, as discussed in the general provisions to Measures F and G.

Where a floor area is subdivided by walls, provision should be made for a free air passage from any part of the floor area to the vent or vents required by Sentence (6) of Measure H. Such provisions for venting need not apply to public corridors or washrooms that normally have a minimum of combustibles.

There should be no problem where vents are on outside walls, and each room or space can be vented directly to the outdoors. Where a smoke shaft is used, however, a fire may occur in a space adjacent to a stairshaft or elevator shaft which is separated by partitions from the smoke shaft vent. The solution may be to vent each space to the smoke shaft through the ceiling plenum or to provide suitable openings in the partitions. Where each room or space opens on to a corridor leading to stairshafts and elevator shafts, location of the smoke shaft vent in the corridor will be effective in limiting movement of smoke to other floors, but may also present problems to the fire fighter, who may have to approach the fire through a smoke-filled corridor.

Where Measure H is adopted, and a fire is detected by an automatic device or a manual pull station is actuated, it is intended that a fire alarm will sound on all floors simultaneously, and that the occupants of the fire floor will walk down stairs to the street floor or to a safe intermediate floor area. Occupants of other floors may remain until advised to evacuate by the person operating the central alarm and control facility.

Measure H

(1) The requirements of Sentences (1) to (3) of Article 3.2.6.2. of Division B may be met by incorporating the requirements in Sentences (2) to (9).

(2) The building air handling system is designed and installed so that
(a) supply fans are capable of maintaining an air flow into the building not less than that obtained from Graph 5 in Appendix A of this Supplementary Standard when the outdoor air temperature is equal to the January design temperature on a 2.5 per cent basis, and
(b) a portion of the air flow referred to in Clause (a) is directed into each stairshaft in a quantity equal to 0.094 m^3/s for every weatherstripped door into the stairshaft and 0.142 m^3/s for every non-weatherstripped door into the stairshaft.

(3) Exit stairs shall discharge to the outdoors through a vestibule described in Sentence (3) of Measure D and be provided with a mechanical air supply of not less than 0.094 m^3/s per weatherstripped door and 0.189 m^3/s per non-weatherstripped door in the vestibule, except that the vestibule may be a corridor, lobby or other space.

(4) When smoke control measures are initiated by the controls referred to in Sentence (9)
(a) all main return and exhaust fans are stopped,
(b) supply fans provide the air flow into the stairshafts described in Clause (2)(b), and
(c) supply fans maintain an air flow into the building controlled in relation to outdoor air temperature, so that the total air flow into the building is substantially equal to the proportion of the air flow referred to in Clause (2)(a) shown in Graph 6 in Appendix A of this Supplementary Standard, but not less than the air flow obtained when the factor F6 equals 0.0025.

(5) All openings in external walls and roofs, including vents to vertical service spaces other than those referred to in Sentence (7), have closures that will close as provided in Sentence (9).

(6) All return and exhaust ducts more than 130 cm^2 in cross-sectional area at the point of entry to a vertical service space are provided with dampers that will close on the floor on which fire occurs as required by Sentence (9), other than those covered by Sentence (7).

(7) In order to achieve a reduction in air pressure on the floor on which fire occurs relative to that on other floors, means of venting each floor space to the outdoors are provided as described in Section 3.

(8) Where a supply of air is required by Sentence (2), it is carried in ducts as described in Sentence (13) of Measure F.

(9) The central alarm and control facility required by Article 3.2.6.12. of Division B is provided with additional controls capable of

(a) stopping main return and exhaust fans and maintaining the air flow in the supply systems as provided in Sentence (2),

(b) closing the closures and dampers required in Sentences (5) and (6), and

(c) opening closures to the vent openings on the fire floor as provided in Sentence (7).

Measures I and J Partially Pressurized Buildings

General

Measures I and J are very similar to Measure H, except that they may be applied to buildings where windows may be open during normal use. They are thus particularly suitable for controlling smoke movement in residential buildings. Plans of typical buildings where Measures I and J are appropriate are shown in Figures 9 and 10. The central core, which includes exit stairshafts, elevator shafts and public corridors, is separated from the remainder of the floor areas. It is important that the leakage area of walls around the core be less than that of the exterior walls of the building.

Measure J is the same as Measure I, except that no provision is made in Measure J to limit smoke movement into upper floors by way of vertical shafts and ducts that are outside the core.

Air is injected into the core so that the air pressure in the core at the ground floor is equal to exterior air pressure at the same level. Provision of a vent to the outdoors in the fire suite will cause air to flow from adjacent parts of the building into the fire suite. This is the only method, apart from Measure B, that enables smoke to be confined to the fire suite.

Where movement of smoke from floor to floor outside the central core is to be limited as in Measure I (but not J), all vertical service shafts, other than elevator shafts, penetrating floor areas must be sealed at intervals or vented to the outdoors at the top, as discussed in the general requirements of Measure D.

The air flow requirements in Graph 5 in Appendix A of this Supplementary Standard are based on the air leakage characteristics of typical corridor walls and doors. If the leakage areas exceed those given in the notes to Graph 5, the air flow should be increased in direct proportion.

Stack action and the operation of smoke control measures may produce pressures across certain doors that will interfere with their normal operation. This may apply to any door between a suite and a corridor that swings into the corridor and is farther above grade than the height shown in Graph 8 in Appendix A of this Supplementary Standard.

Within a suite that is subdivided by partitions, the space that includes the vent to the outdoors described in Sentence (4) of Measure I should be in the same space as the door to the public corridor or linked to it by a leakage area of not less than 0.05 m^2.

Where a mechanical air supply is required by Sentence (2) of Measure I and Sentence (2) of Measure J, it may be desirable to heat the air supply and to provide two air intakes in separate locations on the building face as discussed in the general provisions to Measures F and G.

Where Measure I is adopted and a fire is detected by an automatic device or a manual pull station is actuated, it is intended that a fire alarm will sound on all floors simultaneously, and that the occupants of the fire floor will walk down stairs to the street floor or to a safe intermediate floor area. Occupants of other floors may remain until advised to evacuate by the person operating the central alarm and control facility.

Where Measure J is adopted and a fire is detected by an automatic device or a manual pull station is actuated, it is intended that a fire alarm will sound on all floors simultaneously, and that occupants of all floors will walk down stairs to the street floor or to a safe intermediate floor area.

Measure I (including restriction on the movement of smoke from floor to floor)

(1) The requirements of Sentences (1) to (3) of Article 3.2.6.2. of Division B may be met by incorporating the requirements in Sentences (2) to (10).

(2) The building air handling system is designed and installed so that supply fans are capable of maintaining an air flow into the space that includes all required exit stairshafts, all shafts containing elevators for fire fighters and public corridors, not less than that obtained from Graph 5 in Appendix A of this Supplementary Standard, when the outdoor air temperature is equal to the January design temperature on a 2.5 per cent basis.

(3) Any vent at the top of a vertical service shaft within the central core and all other openings penetrating the space that includes the stairshafts, elevator shafts and public corridors are provided at the point of penetration with closures that will close in the event of a fire, as provided in Sentence (10).

(4) Means of venting each fire compartment to the outdoors are provided by
(a) an opening in an exterior wall, such as an openable window or panel, having an openable area of not less than 0.4 m^2,
(b) an opening into a smoke shaft, as described in Section 3, operated by a smoke detector, or
(c) an exhaust system, such as a kitchen or washroom exhaust, that has an air flow to the outdoors of not less than 0.189 m^3/s per fire compartment served, provided the exhaust system is designed to function as a smoke shaft and meets the relevant requirements of Section 3.
(5) Where a closure is provided in an opening referred to in Clauses (4)(a) or (b) it will open
(a) by operation of a fusible link, or
(b) on a signal from a smoke detector in the room or suite.

(6) A vertical service space that is outside the pressurized space referred to in Sentence (2) is provided with
(a) a tight-fitting noncombustible seal or fire stop
  (i) at the level of the floor immediately below the storey in which egress directly to the outdoors occurs, and
  (ii) at the level of certain other floors that are fire separations, provided the space between fire stops is not more than five storeys, or
(b) a vent to the outdoors as described in Sentence (10) of Measure F.

(7) Except as otherwise provided in Sentences (2) and (4), and except for exhaust from kitchens, washrooms and bathrooms in dwelling units, air moving fans are stopped during a fire emergency in an air handling system that serves more than two storeys.

(8) In an air handling system that is required to shut down by Sentence (7), supply, return and exhaust ducts more than 0.013 m^2 in cross-sectional area at the point of entry to a vertical service space are provided with dampers that close when the air moving fans are stopped.

(9) Where a supply of air is required by Sentence (4), it is carried in ducts as described in Sentence (13) of Measure F.

(10) The central alarm and control facility required by Article 3.2.6.12. of Division B is provided with additional controls that are capable of
(a) stopping return and exhaust fans, closing dampers in ducts and maintaining the air flow in the supply system to the space that includes stairshafts, elevator shafts and corridors as provided in Sentences (2) and (7),
(b) causing dampers and closures in the enclosing walls of the space that includes stairshafts, elevator shafts and corridors to close as required by Sentence (3),
(c) opening closures to vents in vertical service spaces where required by Sentence (6),
(d) opening closures in vents referred to in Sentence (4), individually or in groups limited to one floor at a time, and
(e) initiating the air flow in the exhaust system from any floor, where required by Clause (4)(c).

Measure J (no restriction on the movement of smoke from floor to floor)

(1) The requirements of Sentences (2) and (3) of Article 3.2.6.2. of Division B may be met by incorporating the requirements in Sentences (2) to (6).

(2) The building air handling system is designed and installed so that supply fans are capable of maintaining an air flow into the space that includes all required exit stairshafts, all shafts containing elevators for fire fighters and public corridors, not less than that obtained from Graph 5 in Appendix A of this Supplementary Standard, when the outdoor air temperature is equal to the January design temperature on a 2.5 per cent basis.

(3) Any vent at the top of a vertical service shaft within the central core, and all other openings penetrating the space that includes the stairshafts, elevator shafts and public corridors, are provided at the point of penetration with closures that will close in the event of fire, as provided in Sentence (4).

(4) Except as otherwise provided in Sentence (2), and except for exhaust fans from kitchens, washrooms and bathrooms in dwelling units, air moving fans are stopped during a fire emergency in an air handling system that serves more than two storeys.

(5) Where a supply of air is required by Sentence (2), it is carried in ducts as described in Sentence (13) in Measure F.

(6) The central alarm and control facility required by Article 3.2.6.12. of Division B is provided with additional controls that are capable of
(a) stopping return and exhaust fans and maintaining the air flow in the supply system to the space that includes stairshafts, elevator shafts and corridors as provided in Sentence (2), and
(b) causing dampers and closures in the enclosing walls of the space that includes stairshafts, elevator shafts and corridors to close as required by Sentence (3).

Measure K Vertically Divided Buildings

General

In Measure K a degree of protection for occupants is achieved by providing either a spatial separation or a fire separation between two parts of the building as shown in Figures 11 and 12. Under these conditions, except as subsequently noted, air pressures on either side of the division will be symmetrical and smoke should not pass from one side to the other. Smoke from fire in one part of the building may be expected to pass into the stairshafts, elevator shafts and floor areas on the fire side, while the equivalent spaces on the other side will remain smoke free. Vestibules and bridges are provided as means of access to refuge areas for occupants of floor areas in the part of the building that is exposed to fire and smoke.

Vestibules or bridges are either vented to the outdoors or pressurized mechanically in order to prevent their acting as paths for the transmission of smoke. In vented vestibules below the neutral pressure plane of the building, air will normally flow from the vestibules to the floor areas and no smoke should enter the vestibules. In vestibules above the neutral pressure plane, air will flow from the floor area to the vestibule and thence to the outdoors.

If a window breaks in the fire area, the pressure in the fire area will be the same as that in the vestibule and no smoke transfer should occur. Where vestibules are mechanically pressurized, the air flow will always be from the vestibule to the floor areas on either side, thus limiting the possibility of smoke entering the vestibule.

Provision of an opening to the outdoors at the foot of a stairshaft will increase the air pressure in the shaft in winter and thus reduce the probability of entry of smoke from a floor on which a fire occurs.

Where a dividing wall is used to separate the two parts of a building (Figure 12), breakage of a window in a fire compartment below the neutral pressure plane can be undesirable. The pressure in the fire compartment will increase to a level approximately the same as exterior pressure, and this may cause substantial smoke flow through the dividing wall from the fire side to the other side of the building. This consideration does not apply to a spatial separation as shown in Figure 11. Provisions have been included to allow windows below the mid-height of a building on the side away from a fire to be opened manually in order to bring the pressure in that space to the exterior pressure and to eliminate the pressure difference across the dividing wall.

While the most efficient solution to the problem of moving occupants to a place of safety is to have bridges or connecting vestibules at each floor level, the requirements in Measure K are that such bridges or vestibules should be at intervals of not more than five storeys, and in the case of residential buildings more than 75 m high, the bridges or vestibules should be on each storey. The approaches to the bridges or vestibules are by stairs and corridors whose width is controlled by Sentences (6) and (7) of Measure K. These provisions combine to enable all occupants to reach a place of safety in about three minutes.

Stack action and the operation of smoke control measures may produce pressures across certain doors that will interfere with their normal operation. This may apply where a building has vestibules vented to the outdoors

(a) at any door that swings into a vestibule from a floor space farther below the mid-height of the building than the distance shown in Graph 8 in Appendix A of this Supplementary Standard.

(b) at any door that swings out of a vestibule from a floor space that is farther above the mid-height of the building than the distance shown in Graph 8 in Appendix A of this Supplementary Standard.

(c) at any door between a floor space and an elevator shaft that is farther above or below the mid-height of the building than the distance shown in Graph 8 in Appendix A of this Supplementary Standard.

(d) at any door between a floor space and a stairshaft that is farther above grade than the height shown in Graph 8 in Appendix A of this Supplementary Standard.

In a building that has vestibules that are pressurized, pressures that may interfere with the normal operation of doors may occur with any door between a vestibule and a floor space where the rate of air injection exceeds 0.165 m^3/s for each weatherstripped door, or 0.33 m^3/s for each door that is not weatherstripped, and any door between a floor space and an elevator shaft that is farther above or below the mid-height of the building than the height shown in Graph 8 in Appendix A of this Supplementary Standard.

Where a mechanical air supply is required by Sentence (11) of Measure K, it may be desirable to heat the air supply and to provide two air intakes in separate locations on the building face as discussed in the general provisions to Measures F and G.

Where Measure K is adopted and a fire is detected by an automatic device or a manual pull station is actuated in a smoke control region of the building, it is intended that a fire alarm will sound on all floors in that smoke control region, and that the occupants on all floors will move through the dividing vestibules or bridges to the other smoke control region.

Measure K

(1) The requirements of Sentences (1) to (3) of Article 3.2.6.2. of Division B may be met by incorporating the requirements of Sentences (2) to (17).

(2) The building is designed as

(a) a structure divided into two smoke control regions by a continuous vertical fire separation that has a fire-resistance rating not less than that required for a floor in Subsection 3.2.2. of Division B, or

(b) two or more smoke control regions separated by spatial separations that conform to the provisions of Subsection 3.2.3. of Division B.

(3) Bridges or vestibules are provided at intervals of not more than five storeys to permit movement of occupants from one smoke control region to the other, except that in the case of residential buildings more than 75 m high, the bridges or vestibules are located on each storey.

(4) In each smoke control region referred to in Sentence (2), there is not less than one exit stairshaft and one elevator in a shaft that meets the requirements of Article 3.2.6.9. of Division B and that is not common to both smoke control regions.

(5) The floor area on either side of a bridge or vestibule is of sufficient size to accommodate its own normal population, plus the occupants of the one to five storeys of the adjacent smoke control region who may have to enter the floor area during a fire emergency, assuming 0.5 m² per ambulatory person and 1.5 m² per non-ambulatory person.

(6) The width of each bridge or vestibule and each connecting corridor and door on the same storey is sufficient to provide not less than 3.67 mm of width for each person who may have to use these passages to reach the floor area referred to in Sentence (5) from the adjacent smoke control region.

(7) The width of each stair or ramp that provides access to a floor having a bridge or vestibule from intervening floors is sufficient to provide not less than 5.5 mm of width for each person who may have to use the stair to reach the bridge or vestibule referred to in Sentence (6).

(8) Between each bridge or vestibule and public corridor is a fire separation that has a 45 min fire-resistance rating.

(9) Between each bridge or vestibule and a floor area other than the public corridor referred to in Sentence (8), is a fire separation that has a fire-resistance rating as required for exits in Subsection 3.4.4. of Division B

(10) Each door opening into a bridge or vestibule conforms to Articles 3.4.6.9. and 3.4.6.10. of Division B and is suitably identified as an access to an area of refuge.

(11) Each bridge or vestibule is provided with
(a) a vent opening to the outdoors that has an open area not less than 1 m² and that may be provided with a closure that is openable manually, or
(b) a mechanical air supply not less than that obtained from Graph 7 in Appendix A of this Supplementary Standard that will be initiated as provided in Sentence (17).

(12) Where the building is divided into two smoke control regions by a fire separation as described in Clause (2)(a), each floor area below the mid-height of each smoke control region is provided with a vent opening to the outdoors that has an open area of not less than 1.5 m² and that is normally closed but can be opened manually.

(13) Each stairshaft is vented to the outdoors as described in Sentence (4) of Measure A.

(14) Except as provided in Sentence (11), and except for exhaust from kitchens, washrooms and bathrooms in dwelling units, air moving fans are stopped during a fire emergency in an air handling system that serves more than two storeys.

(15) Floor areas below the lowest exit storey are divided by a fire separation that has a fire-resistance rating not less than that required in Clause (2)(a) and is in a location corresponding to the fire or spatial separations required for upper storeys. Doorways protected by pressurized vestibules are provided in the separations as described in Clause (11)(b).

(16) Where a supply of air is required by Sentences (11) and (15), it is carried in ducts as described in Sentence (13) of Measure F.

(17) The central alarm and control facility required by Article 3.2.6.12. of Division B is provided with additional controls that are capable of
(a) closing doors in fire separations required by Sentences (8), (9) and (15) between floor areas and vestibules,
(b) initiating the mechanical air supply to the vestibules where required by Clause (11)(b) and Sentence (15), and
(c) stopping air handling systems where required by Sentence (14).

Measure L Areas of Refuge (smoke free areas)

General

Measure L is intended to provide refuge areas which occupants may enter during a fire. It may be used for buildings that have many openings between floors so that it is impracticable to confine smoke to one floor level.

This measure is basically the same as described in Measure D, except that larger quantities of air must be injected into each area of refuge than into a comparable vestibule in order to maintain tolerable conditions for the occupants. A typical floor plan is shown in Figure 13. The area of refuge may include normally occupied space in the building, and because fire may occur in one of these spaces, provision is made for alternative groups of areas of refuge.

Except in the case of Group C buildings more than 75 m high, areas of refuge may be provided on every fifth floor if the access routes are made wide enough to allow all occupants to reach the area of refuge within three minutes (see Figure 14). Stairshafts and elevators for fire fighters must be protected on intermediate floors by vestibules or by pressurization of the shafts.

Stack action and the operation of smoke control measures may produce pressures across certain doors that will interfere with their normal operation. This may apply to any door between an area of refuge and a floor space that is farther above grade than the height shown in Graph 8 in Appendix A of this Supplementary Standard.

Between every area of refuge and the floor space the building should have a vent fitted with a self-closing damper that will permit air to move from the area of refuge to the floor space but not vice-versa. It should have an openable area not less than 6 cm^2 for every 0.005 m^3/s of air injected into the area of refuge in excess of that specified in Measure D for a pressurized vestibule.

Where Measure L is adopted and a fire is detected by an automatic device or a manual pull station is actuated, it is intended that an alarm will sound on all floors simultaneously, and that occupants of all floors will move to areas of refuge distributed throughout the building and await instructions over the voice communication system.

Where a mechanical air supply is required by Sentence (9) of Measure L, it may be desirable to heat the air supply and to provide two air intakes in separate locations on the building face, as discussed in the general provisions to Measures F and G.

Measure L

(1) The requirements of Sentences (1) to (3) of Article 3.2.6.2. of Division B may be met by incorporating the requirements of Sentences (2) to (20).

(2) Two independent groups of areas of refuge are distributed through the building so that there is an area of refuge in each group at least at every fifth storey, and each group is linked by a common exit stair to the exterior at grade.

(3) On any floor area any area of refuge that has a door to an exit stair may also have a door to an elevator for fire fighters, but two exit stairs may not open on to the same area of refuge if no other vertical shaft is common to the two independent systems described in Sentence (2).

(4) Each group of areas of refuge referred to in Sentence (2) can accommodate all the occupants of above grade storeys at the rate of 0.5 m^2 of floor area per ambulatory person or 1.5 m^2 per non-ambulatory person.

(5) The width of corridors and doors leading to an area of refuge on the same storey is sufficient to provide 3.67 mm of width for each person who may have to use these passages to reach the area of refuge.

(6) The width of stairs or ramps leading to an area of refuge from intervening floors is sufficient to provide 5.5 mm of width for each person who may have to use the stairs or ramps to reach the area of refuge.

(7) Between each area of refuge and a public corridor is a fire separation that has a 45 min fire-resistance rating.

(8) Between each area of refuge and a floor area other than the public corridor referred to in Sentence (7), is a fire separation that has a fire-resistance rating as required for exits in Subsection 3.4.4. of Division B

(9) Each door opening into an area of refuge conforms to the provisions for doors in Article 3.4.6.10. of Division B and is suitably identified as an access to an area of refuge.

(10) Each area of refuge is provided with a mechanical air supply not less than that required for a vestibule providing access to a stairshaft or an elevator shaft in Clause (5)(b) of Measure D, and obtained from Graph 3 in Appendix A of this Supplementary Standard, or not less than 0.002 m^3/s for each occupant of the area of refuge during a fire emergency, whichever is greater.

(11) Any door in an exit stairshaft or in a shaft that contains an elevator for fire fighters that does not open directly into an area of refuge is provided with a pressurized vestibule as described in Sentence (5) of Measure D, except where the stairshaft or elevator shaft is pressurized as described in Sentences (2) and (4) of Measure F.

(12) Except as provided in Sentence (11), an elevator shaft that contains an elevator for fire fighters is provided with a pressurized vestibule as described in Sentences (2), (3) and (5) of Measure D or is pressurized as described in Sentence (4) of Measure F.

(13) Any elevator shaft that contains an elevator for fire fighters or opens into an area of refuge and passes through the floor above the lowest exit storey does not penetrate the floor of the storey immediately below the lowest exit storey, except where there is a vestibule between the elevator door or doors and each floor area below grade as described in Sentence (3) of Measure D.

(14) A stairshaft serving storeys above the lowest exit level is vented to the outdoors at or near the bottom of the stairshaft as described in Sentence (4) of Measure A.

(15) A stairway serving storeys below the lowest exit level is protected as described in Sentence (3) of Measure A.

(16) Each elevator shaft protected by a vestibule or area of refuge having a mechanical air supply as described in Sentences (9) and (10) has a vent at or near the bottom of the shaft opening directly to the outdoors or into a vestibule or corridor that has a similar opening to the outdoors having an openable area not less than 0.023 m^2 for every door into the shaft, other than doors at street floor level.

(17) The vent at the bottom of an elevator shaft referred to in Sentence (16) may be provided with a closure which is openable manually and is designed to remain open during a fire emergency.

(18) Except for air moving fans serving areas of refuge and vestibules as provided in Sentences (10) to (12), and except for exhaust from kitchens, washrooms and bathrooms in dwelling units, air moving fans are stopped during a fire emergency in an air handling system that serves more than two storeys.

(19) Where a supply of air is required by Sentences (10), (11), (12) and (15), it is carried in ducts as described in Sentence (14) of Measure F.

(20) The central alarm and control facility required by Article 3.2.6.12. of Division B is provided with additional controls that are capable of

(a) closing doors in fire separations required by Sentences (7) and (8) between floor areas and areas of refuge or vestibules,

(b) stopping air handling systems as required by Sentence (18).

(c) opening closures in vents to the outdoors in elevator shafts that may be required by Sentence (12), and
(d) initiating the mechanical air supply to the areas of refuge, vestibules and shafts as may be required by Sentences (10), (11), (12) and (15).

Measure M Residential Buildings with Balconies

General

In residential buildings the greater part of the requirements for control of smoke movement are waived where each suite has direct access to a balcony. The protective features are limited to stopping air handling systems, providing an opening to the outdoors at the foot of stairshafts serving upper floors and protection of stairshafts in storeys below grade. A typical arrangement is shown in Figure 16.

Where Measure M is adopted and a fire is detected by an automatic device or a manual pull station is actuated, it is intended that occupants on the fire floor will evacuate if possible, and that occupants of other floors may remain in their suites to await instructions.

Measure M

(1) The requirements of Sentence 3.2.6.6.(1) of Division B may be met by incorporating the requirements of Sentences (2) to (7).

(2) A stairshaft serving storeys above the lowest exit level has a vent or door to the outdoors at or near the bottom of the stairshaft, as described in Sentence (4) of Measure A.

(3) A stairway serving storeys below the lowest exit level is protected as described in Sentence (3) of Measure A.

(4) Any elevator shaft that passes through the floor above the lowest exit storey does not penetrate the floor of the storey immediately below the lowest exit storey, except where there is a vestibule between the elevator door or doors and each floor area below grade as described in Sentence (3) of Measure D.

(5) Except for exhaust from kitchens, washrooms and bathrooms in dwelling units, air moving fans are stopped during a fire emergency in an air handling system that serves more than two storeys.

(6) Where a supply of air is required by Sentence (3), it is carried in ducts as described in Sentence (13) of Measure F.

(7) The central alarm and control facility required by Article 3.2.6.12. of Division B is provided with additional controls that are capable of
(a) stopping air handling systems as required by Sentence 3.2.6.6.(1) of Division B, and
(b) initiating the mechanical air supply to stairshafts as may be required by Clause (3)(c).

Measure N Connected Buildings

General

The measures described here are intended to prevent movement of smoke from one building to another. They are of particular significance where two buildings of unequal height are joined together. The techniques suggested are the provision of a large opening to the outdoors in a connecting vestibule so that smoke entering through leakage areas around doors will be vented to the outdoors, or pressurization to maintain a higher pressure in the vestibule than in adjacent spaces as illustrated in Figures 17 and 18.

The requirements for protection of openings are described in terms appropriate to a doorway. Any other openings should be avoided if possible. Where they occur, they should be protected by the provision of an air lock that gives the same standard of protection as the vestibule described in Sentence (3).

Measure N

(1) The requirement of Sentence 3.2.6.7. of Division B that limits movement of smoke from one building to another may be met by incorporating in the link between the buildings the requirements in Sentences (2) and (3).

(2) Between one building and the other is a firewall as described in Subsection 3.1.10. of Division B.

(3) Any opening in the firewall is protected against passage of smoke by a vestibule described in Sentence (3) of Measure D and has

(a) a vent to the outdoors that has a net area of $10(0.023d + 0.00045a)$ m², where d is the number of doors having a perimeter not more than 6 m that open into the vestibule, or if the perimeter of doors exceeds 6 m, the value of d is increased in direct proportion to the increase in the perimeter, and a is the area in square metres of enclosing walls, floors and ceilings whose outer face is in contact with the outside air, except that where the outer face of a wall is in contact with the ground or fill, it is assumed that there is no leakage through that portion, and the value of a is assumed to be zero, or

(b) equipment capable of maintaining a supply of air into the vestibule sufficient to ensure that the air pressure in the vestibule when the doors are closed is higher by at least 12 Pa than that in adjacent floor areas when the outdoor temperature is equal to the January design temperature on a 2.5 per cent basis.

Section 3 Venting of Floor Areas

(1) The requirements of Sentence 3.2.6.10.(1) of Division B and of Measures H or I are met by incorporating in a floor area windows or wall panels as described in Sentence (2), by smoke shafts as described in Sentences (3) to (7) or by the use of building exhaust systems as described in Sentence (8).

(2) Where windows or wall panels are used for venting as required in Sentence (1), they must

(a) be uniformly distributed along the exterior wall of each storey,

(b) have a total area of not less than one per cent of the exterior wall area of each storey,

(c) be readily openable from the interior without the use of wrenches or keys,

(d) be readily identified from the interior, and from the exterior where they are accessible to fire fighters, and

(e) be designed so that when opened they will not endanger persons outside the building during a fire.

(3) Where one or more smoke shafts or vertical service spaces are used for venting to meet the requirements of Sentence (1), they must

(a) have an opening or openings into each storey with an aggregate area not less than that obtained from Table 2 for the height of the shaft, the area of the largest floor area served by the smoke shaft and the leakage characteristics of the shaft wall and dampers obtained from Tables 3 and 4,

(b) have an aggregate unobstructed cross-sectional area equal to that provided in Clause (a), and

(c) be designed to comply with the requirements of Sentence (4).

(4) Each smoke shaft or vertical service space described in Sentence (3) must

(a) be separated from the remainder of the building by a fire separation that has a fire-resistance rating at least equal to that required for the floor assembly through which it passes, or be designed as a chimney conforming to Part 6 of Division B, except that flue liners need not be provided,

(b) have an opening to the outdoors at the top that has an area not less than the cross-sectional area of the shaft which may be protected from the weather,

(c) terminate not less than 900 mm above the roof surface where it penetrates the roof, and

(d) contain no combustible material, fuel lines or services that are required for use in an emergency.

(5) Each opening required by Clause (3)(a) must be located so that the top of the opening is not more than 250 mm below the ceiling, except that the opening may be above the ceiling if the ceiling freely allows passage of air and the opening into the smokeshaft is provided with a closure that

(a) has a fire-protection rating conforming to Sentence 3.1.8.4.(2) of Division B, except that the temperature on the unexposed face of the closure is not more than 250°C after 30 min during the fire test and there is no combustible material within the distances described in Table 5, and except that paint or tightly-adhering paper covering not more than 1 mm thick shall be exempted from these requirements when applied to a noncombustible backing,

(b) can be opened from a remote location such as a stairshaft, the storey immediately below or the central alarm and control facility, and

(c) must not open automatically on any floor, other than the fire floor, when smoke or hot gases pass through the shaft.

(6) Closures for openings described in Clause 4(b) are to be openable from the outside and will open automatically on a signal from a smoke detector in the shaft, by operation of the fire alarm system and when a closure required in Sentence (5) opens.

(7) A smoke shaft opening referred to in Sentence (2) or (3) that is less than 1 070 mm above the floor must conform to Article 3.3.1.17. of Division B.

(8) In a sprinklered building the air handling system may be used for smoke venting provided

(a) the system can maintain an exhaust to the outdoors at the rate of six air changes per hour from any floor area, and

(b) emergency power to the fans required by (a) is provided as described in Article 3.2.7.9. of Division B.

(9) Where a damper is required by Sentence (5), the leakage area between damper components and between damper and frame must be not more than 3 per cent of the openable area of the damper.

Table 2
Minimum Size of Vent Openings into Smoke Shafts from Each Floor Area, m^2(1)(3)

Floor Area, m^2	Leakage Area, %(2)	Building Height, m								
		18	37	73	110	146	183	220	256	293
200	0	0.10	0.11	0.13	0.15	0.16	0.18	0.19	0.20	0.22
500		0.22	0.25	0.29	0.32	0.36	0.37	0.39	0.41	0.43
1 000		0.43	0.48	0.53	0.59	0.63	0.67	0.71	0.75	0.77
2 000		0.83	0.91	1.01	1.08	1.16	1.22	1.29	1.34	1.39
3 000		1.21	1.33	1.46	1.55	1.67	1.75	1.82	1.90	1.97
4 000		1.62	1.75	1.90	2.02	2.15	2.25	2.35	2.44	2.53
5 000		2.01	2.17	2.34	2.46	2.63	2.74	2.86	2.88	3.07
6 000		2.39	2.57	2.76	2.91	3.10	3.23	3.37	3.47	3.58
200	1	0.10	0.12	0.15	0.19	0.22	0.27	0.35	0.43	0.55
500		0.23	0.27	0.35	0.40	0.49	0.57	0.69	0.83	1.04
1 000		0.44	0.50	0.71	0.72	0.86	1.01	1.19	1.43	1.73
2 000		0.85	0.97	1.15	1.33	1.56	1.81	2.10	2.48	2.95
3 000		1.26	1.42	1.67	1.91	2.23	2.56	2.97	3.47	4.08
4 000		1.66	1.88	2.18	2.49	2.37	3.28	3.79	4.40	5.16
5 000		2.07	2.32	2.69	3.05	3.51	3.99	4.60	5.32	6.21
6 000		2.47	2.76	3.18	3.59	4.14	4.68	5.37	6.20	7.23
200	2	0.10	0.13	0.18	0.24	0.37	0.61	1.28	4.60	89.57
500		0.24	0.29	0.39	0.52	0.75	1.13	2.10	6.11	94.50
1 000		0.45	0.55	0.72	0.94	1.30	1.90	3.27	8.29	102.11
2 000		0.88	1.05	1.34	1.73	2.32	3.28	5.36	12.14	116.80
3 000		1.31	1.53	1.95	2.47	3.29	4.58	7.28	15.63	130.83
4 000		1.73	2.01	2.55	3.20	4.23	5.83	9.12	19.97	144.03
5 000		2.15	2.49	3.13	3.92	5.15	7.05	10.90	22.15	157.05
6 000		2.57	2.96	3.73	4.63	6.07	8.26	12.65	25.39	169.29
200	3	0.11	0.14	0.21	0.37	0.88	2.06			
500		0.25	0.31	0.47	0.76	1.58	9.00			
1 000		0.47	0.59	0.86	1.33	2.60	11.99			
2 000		0.91	1.12	1.60	2.41	4.47	17.46			
3 000		1.35	1.64	2.31	3.43	5.21	22.48			
4 000		1.79	2.17	3.02	4.43	7.91	27.29			
5 000		2.22	2.68	3.71	5.42	9.55	31.95			
6 000		2.65	3.20	4.40	6.39	11.18	36.47			
200	4	0.11	0.15	0.28	0.70	24.83				
500		0.25	0.34	0.58	1.33	29.18				
1 000		0.49	0.63	1.06	2.27	36.07				
2 000		0.95	1.21	1.97	3.99	48.56				
3 000		1.41	1.78	2.84	6.63	60.15				
4 000		1.86	2.34	3.70	7.22	71.15				
5 000		2.21	2.90	4.55	8.79	81.81				
6 000		2.75	3.46	5.40	10.33	90.05				
Column 1	2	3	4	5	6	7	8	9	10	11

Table 2 (Cont'd)
Minimum Size of Vent Openings into Smoke Shafts from Each Floor Area, m^2[1][3]

Floor Area, m²	Leakage Area, %[2]	Building Height, m								
		18	37	73	110	146	183	220	256	293
200	5	0.11	0.16	0.36	3.33					
500		0.28	0.36	0.76	5.09					
1 000		0.50	0.69	1.37	7.67					
2 000		0.99	1.31	2.54	12.35					
3 000		1.46	1.94	3.65	16.75					
4 000		1.92	2.55	4.75	20.99					
5 000		2.40	3.16	5.84	25.11					
6 000		2.87	3.74	6.92	29.11					
Column 1	2	3	4	5	6	7	8	9	10	11

Notes to Table 2:

(1) The minimum size of a vent opening into a smoke shaft is obtained from Table 2 and is dependant on the floor area and total leakage area of the smoke shaft walls and dampers. This total leakage area may be estimated by adding the leakage areas for the shaft wall obtained from Table 3 and for the dampered openings obtained from Table 4 provided the cross-sectional area of the smoke shaft, the opening into the shaft and the opening to the outdoors at the top of the shaft are equal.

(2) Leakage area is the total of the leakage area of smoke shaft wall obtained from Table 3 and the leakage area of dampered opening in smoke shafts obtained from Table 4.

(3) The size of the vent opening refers to the free or unobstructed area of the opening.

Table 3
Leakage Area of Smoke Shaft Wall

Wall Construction	Leakage Area as a Per Cent of Wall Area
Monolithic concrete	0.5
Masonry wall unplastered	1.5
Masonry wall plastered	0.5
Gypsum board on steel studs	1.0
Column 1	2

Table 4
Leakage Area of Dampered Openings in Smoke Shaft

Type of Damper	Leakage Area as a Per Cent of Damper Area
Curtain fire damper	2.5
Single blade fire damper	3.5
Multi-blade fire damper	4.5
Column 1	2

Notes to Table 4:

(1) For descriptions of dampers refer to Article 3.1.8.9. of Division B.

(2) Values include allowance for 0.5 per cent leakage between frame and wall construction.

(3) These leakage data contemplate clearances applicable to fire dampers which have been tested in accordance with CAN/ULC-S112-M90, "Fire Test of Fire-Damper Assemblies."

Table 5
Minimum Distance from Damper to Combustible Material

Area of Damper,(1) m^2	Minimum Distance in Front of or Above Damper, m	Minimum Distance to the Sides or Below Damper, m
0.5	0.35	0.20
1.0	0.50	0.25
1.5	0.60	0.30
2.0	0.70	0.35
2.5(2)	0.80	0.40
Column 1	2	3

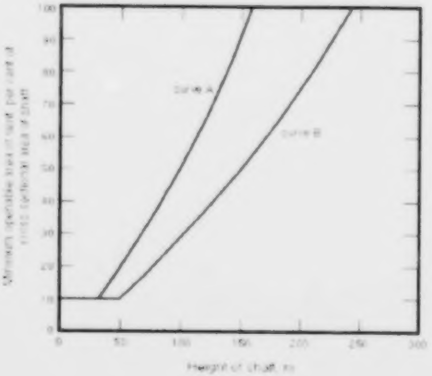
Notes to Table 5:

(1) For damper areas between those given in Table 5, interpolation may be used to determine the appropriate distances.

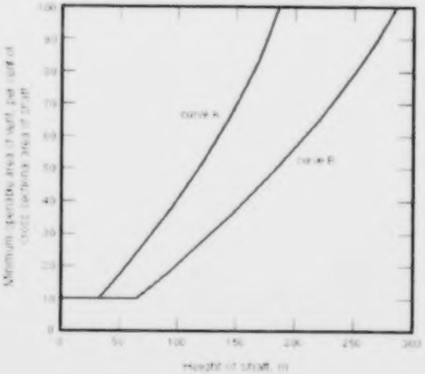
(2) For damper areas greater than 2.5 m^2, the minimum distance in front of or above the damper shall be one half of the square root of the damper area, and the minimum distance to the sides or below the damper shall be one quarter of the square root of the damper area.

Appendix A to SB-4

Graphs for Applying Smoke Control Measures



Graph 1
Vent to a vertical service space where no other shaft in the building is pressurized



Graph 2
Vent to a vertical service space where other shafts in the building are pressurized

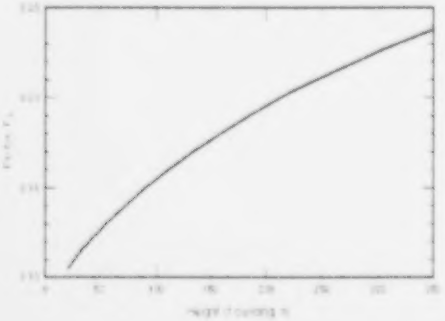
Notes to Graphs 1 and 2:

(1) Curve A applies to a vertical service space that is enclosed by unplastered unit masonry or by plaster and steel stud construction with all openings in the shaft sealed to the degree required by Articles 3.1.9.2. to 3.1.9.4. of Division B.

(2) Curve B applies to a vertical service space that is enclosed by monolithic concrete or by plastered unit masonry with all openings in the shaft sealed tightly to minimize air leakage.

(3) A shaft having a vent that is 100 per cent of the cross-sectional area of the shaft is acceptable for buildings up to 1.5 times the height shown by the appropriate curve in Graphs 1 and 2.

(4) The total leakage area, based on measurements arrived at in typical high buildings, is assumed to be 0.025 m^2 for every 10 m^2 of shaft wall area in the case of Curve A and 0.015 m^2 for every 10 m^2 of shaft wall area in the case of Curve B.



Graph 3 **Factor for mechanical air supply to a vestibule**

Notes to Graph 3:

(1) The air supply to each vestibule in cubic metres per second equals

$$F_v d+0.071e+0.094s$$

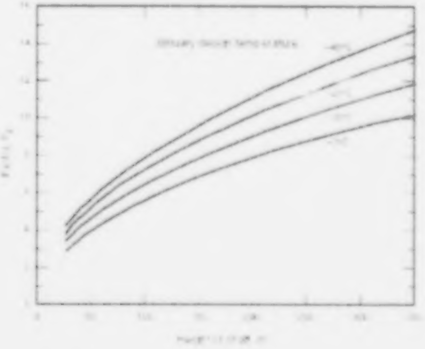
where
F_v is a factor obtained from Graph 3,
d = the number of doors having a perimeter not more than 6 m between each vestibule and a floor area,
e = the number of doors having a perimeter not more than 6 m between each vestibule and an elevator shaft, and
s = the number of doors having a perimeter not more than 6 m between each vestibule and a stairshaft. The quantity "$F_v d+0.071e+0.094s$" represents the total leakage from the vestibule.

(2) If the perimeter of a door exceeds 6 m, the value of d, e or s must be increased in direct proportion to the increase in the perimeter.

(3) A double leaf door is counted as two doors in this formula.

(4) A door provided with tight-fitting weatherstripping is counted as one half of a door.

(5) The height of the building is the number of metres between the roof and the floor level of the lowest basement floor.



Graph 4 Factor for air supply to an elevator shaft

Notes to Graph 4:

(1) The air supply to each elevator shaft in cubic metres per second equals

$$F_4(0.023d_4+0.0014a_4)$$

where

F_4 is the factor obtained from Graph 4
d_4 = total number of doors having a perimeter not more than 6 m that open into the elevator shaft, and
a_4 = area of enclosing walls of the shaft in square metres. The expression "$0.023d_4+0.0014a_4$" represents the total leakage area in the walls of the shaft.

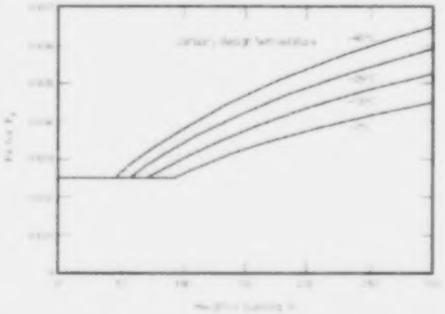
(2) If the perimeter of a door exceeds 6 m, the value of d_4 must be increased in direct proportion to the increase in the perimeter.

(3) A double leaf door is counted as two doors in this formula.

(4) A door provided with tight-fitting weatherstripping is counted as one half of a door.

(5) If the enclosing walls of the shaft are of monolithic concrete or of unit masonry plastered on one side, the value of a_4 may be halved.

(6) If an elevator shaft is provided with vestibules on each floor, the enclosing walls considered in this formula may be taken as including those of the vestibules if it leads to an economy in air supply requirements. In this case d_4 above refers to doors between the vestibules and the floor areas and doors between the elevator shaft and the vestibules do not enter into the calculation.



Graph 5 Factor for air supply for building pressurization

Notes to Graph 5:

(1) If Measure H is used, the air supply delivered to the whole building in cubic metres per second equals

$$F \times a$$

where

F is a factor obtained from Graph 5, and
a = area of all exterior wall surfaces of the building in square metres measured between ground level and underside of the roof. (Where the outer face of a wall is in direct contact with the ground or fill, it is assumed that there is no leakage through that portion, and the value of a is assumed to be zero.)

(2) Graph 5 is based on an air leakage rate of 0.003 m³/s per square metre of exterior wall at a pressure difference of 75 kPa, based on the measured leakage rate in high buildings having fixed windows and curtain wall panels.

(3) This is equivalent to a leakage area in exterior walls of 0.045 m² per 100 m² of wall area. If the leakage area in a building differs significantly from this, the air supply should be adjusted in direct proportion.

(4) The height of building is measured between the underside of the roof and the floor level of the lowest basement floor.

(5) If Measure I or J is used, the air supply delivered to the space that includes stairshafts, elevator shafts and corridors in cubic metres per second equals

$$F(a + 51d)$$

where

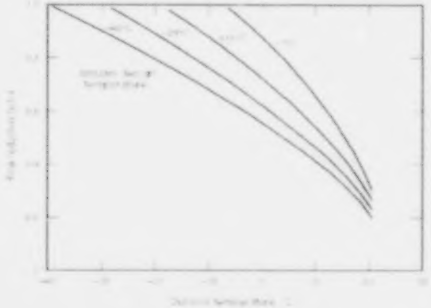
F is a factor obtained from Graph 5 that is not less than 0.0025,
a = area in square metres of the walls enclosing the space that includes stairshafts, elevator shafts and associated corridors on all floors, and
d = total number of doors having a perimeter not more than 6 m in the wall area described in a.

(6) If the enclosing walls described above are of monolithic concrete or of unit masonry plastered on one side, the value of a may be halved.

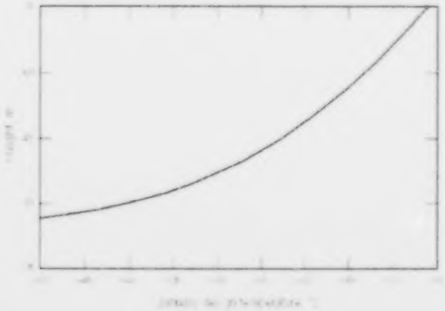
(7) If the perimeter of a door exceeds 6 m, the value of d must be increased in direct proportion to the increase in the perimeter.

(8) A double leaf door is counted as two doors in this formula.

(9) A door provided with tight-fitting weatherstripping is counted as a one half of a door.



Graph 6 Flow reduction factors



Graph 7 Air supply to vestibule in a vertically divided building

Notes to Graph 7:

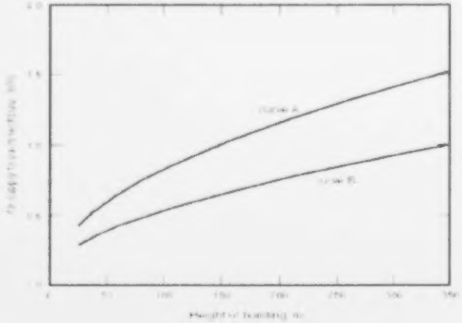
(1) Curve A shows the air supply to each vestibule in cubic metres per second for a vestibule that has four doors (or two double doors), each door having a perimeter of not more than 6 m, between the vestibule and the floor areas on either side of the building.

(2) Curve B shows the air supply to each vestibule in cubic metres per second for a vestibule that has two single doors, each door having a perimeter of not more than 6 m, between the vestibule and the floor areas on either side of the building.

(3) If the perimeter of a door exceeds 6 m, the air supply must be increased in direct proportion to the increase in the perimeter.

(4) If the doors are provided with tight-fitting weatherstripping, the air supply may be halved.

(5) The height of building is the distance between the roof and the floor level of the lowest basement floor.



Graph 8 Height of the shaft relative to grade, or the neutral pressure plane at which pressure across a door may exceed 95 Pa

Appendix B to SB-4

Assumptions Used in Developing Fire Safety Measures

The objectives of the measures for fire safety in high buildings are

(a) to provide for the safety of the occupants of a building, either by maintaining the tenability of the occupied floor spaces during the period of a fire emergency or by making it possible for occupants to move to a place of safety,

(b) to maintain tenable conditions in which occupants may remain in exit stairs leading from floor spaces to the outdoors, and

(c) to maintain tenable conditions in elevators that can be used to transport fire fighters and their equipment from the street floor to the floor immediately below the fire floor.

It is assumed that the fire fighters will use one of the protected stairshafts referred to in (b) to walk up to the fire floor from the floor below.

The first of these objectives may be met by the evacuation of all occupants to the outdoors in from seven to ten minutes, by the movement of occupants to safe areas within the building in from three to five minutes (as in Measures C, E, G, J, K, L and M) or by maintaining the tenability of all floor areas except those on the fire floor and the floor above the fire floor (as in Measures A, B, D, F, H and I).

The requirements in the Building Code covering widths of exits and travel distances to exits make it possible for occupants of a floor on which a fire occurs to leave that floor within one or two minutes provided their escape route is not cut off by the fire.

The objectives of the measures are to maintain certain spaces substantially smoke free for a significant period of time during a fire emergency, and hence some criterion of tenability is called for. The criterion for long term tenability is that a space shall not include more than one per cent by volume of the contaminated atmosphere from the fire region. The criterion of tenability is based on visibility and carbon monoxide concentration.

Mechanisms of Smoke Movement in Buildings

Movement of a smoky atmosphere within a building is not significantly different from that of a normal atmosphere at the same temperature. The principal constituent of both atmospheres is nitrogen. The fact that the concentrations of other component gases will differ and that a smoky atmosphere will contain particulate matter will not influence its overall density to an extent that will significantly affect its movement. The mechanisms to be discussed do, therefore, relate to the movement of a smoky atmosphere as well as a normal atmosphere.

Air Circulating Systems

An obvious mechanism for the dispersal of smoke within a building is the recirculating air handling system. Assuming that the system has been competently designed, the approximate extent of the recirculation under any particular circumstances is known, and hence the build-up in any area of contamination can be predicted.

Effect of Wind

Exterior winds create pressure differentials within buildings, which lead to internal air movement, principally horizontal. Some upward movement also results, however, from the non-uniformity of the wind profile up the side of a building. In addition, if one side of the building is facing the wind, only that face will be subjected to a positive pressure, the remainder being subjected to negative pressure.

Expansion

Another smoke movement mechanism, which is of considerable significance during the early stages of any fire that is not well vented to the outdoors, is the expansion process associated with heating. The leakage characteristics of virtually any building are such that the rate of temperature rise occurring in the fire region cannot create pressure differentials greater than about 250 Pa (gauge). Instead, the volume of the atmosphere increases linearly with absolute temperature. During the development of a fire in a compartment, absolute temperature may be expected to triple, and the volume of gas will increase by approximately the same factor. At least two-thirds of the original atmosphere in the fire region will, therefore, be displaced by this mechanism.

Generation of gases as a result of combustion has also been considered. The volume created by this phenomenon cannot, however, exceed 20 per cent of the original volume, and is not likely to be significant compared to expansion due to temperature rise.

Stack Effect

Whenever a temperature differential exists between the interior and exterior of an enclosure, a phenomenon known as stack or chimney effect prevails. Figure B-1 illustrates the case where the interior temperature is higher than the exterior, and there is an inflow of cold air at low levels and a corresponding outflow at high levels.

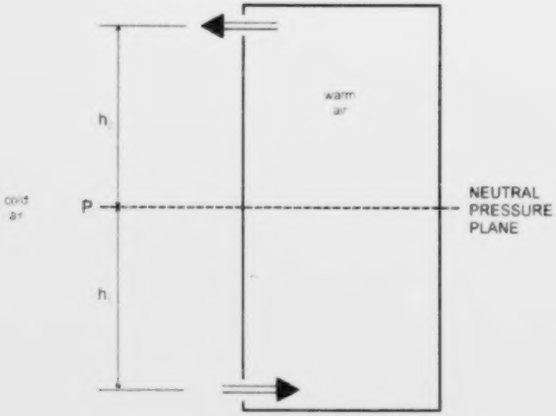


Figure B-1 Stack action

This effect can result from building heating and from temperature differentials created by the fire itself and is particularly important in Canadian buildings because of the cold winter conditions. The pressure differentials generated by stack effect can be calculated by considering the densities of the internal and external atmospheres.

Figure B-1 represents a simplified model in which air flows in at a low level and out at a high level, while there is an intermediate level where there is no pressure differential between interior and exterior. This level is referred to as "the neutral pressure plane". Taking the pressure at the neutral plane as P_o, the pressures at the lower or upper openings can be derived, for they are associated with the weights of the columns of gas above them.

The resulting expression for the pressure difference across the lower opening is

$$\delta p = h_1 g \rho_0 \theta / T_0$$

where

δp = pressure difference,
h_1 is defined in Figure B-1,
T_0 = absolute outdoor temperature,
θ = difference between indoor and outdoor temperature,
ρ_0 = density of indoor air, and
g = acceleration due to gravity.

Substituting $H = (h_1 + h_2)$ will give the total of the pressure head (the sum of the pressure differentials across the upper and lower openings) generated by stack effect.

Importance of Mechanisms Responsible for Smoke Movement

Expansion due to heating of the atmosphere in a fire compartment is largely a transient phenomenon occurring at the development stage of a fire. Two-thirds of the atmosphere of the fire region is likely to be displaced and, if the region were not vented to the exterior, there could be a significant movement of smoke laden atmosphere to other parts of the building. Dispersed evenly throughout the building, and taking into account leakage to outdoors, this displaced atmosphere could render untenable a space equal to about 50 times that of the fire region.

Pressures Due to Stack Effect

In discussing the steady state conditions responsible for smoke movement, total pressure heads generated may be compared. These pressure heads are tabulated in Table B-1 together with the flow rates that they will create beneath a typical door having a free space of 900 mm x 12.5 m beneath it. In Columns 2 and 3, the total head given by stack action resulting from a fire in a single storey is also given by stack action associated with building heating during cold weather in a building three to four storeys high.

Table B-1
Magnitudes of Pressures Developed by Thermal and Wind Effects Magnitudes

Pressure Head, Pa	Height of Heated Compartment, m		Wind Speed, km/h	Flow Beneath Door with 900 x 12.5 mm Gap, m³/s
	800°C above ambient (i.e., on fire)	50°C above ambient		
25	2.9	10.3	23	0.045
50	5.8	20.6	33	0.064
125	14.5	51.6	52	0.100
250	29.1	103.3	73	0.142
500	58.2	206.4	104	0.201
Column 1	2	3	4	5

Assuming that a building is compartmented, fire other than one in a shaft should be confined to a single storey. The total pressure head generated by the fire is thus not likely to exceed about 25 Pa. As buildings are generally heated in their entirety, stack effect associated with building heating can give a total head significantly more than 25 Pa if the building is more than about four storeys high. Thus combatting stack action associated with building heating in high buildings is likely to pose more of a problem than combatting stack action directly associated with a fire. In high buildings emphasis should be placed on the building heating rather than the fire stack action problem.

Effect of Wind

Column 4 of Table B-1 indicates that pressures resulting from winds can be substantial. As mentioned earlier, the greater part of the resulting airflow is horizontal. This does not create as great a hazard as vertical movement via the shafts in a building. An upward flow does exist, however, and its effect is virtually identical to that of stack action associated with building heating. Combatting the latter will, therefore, take account of the more hazardous influence of winds.

Contribution of Air Handling Systems

The effect of recirculating air handling systems is not shown in Table B-1, but it is substantial and hence it must be considered when smoke control techniques are being devised for buildings including such systems.

Significance of Smoke Movement Mechanisms

Given the considerations just discussed, the most significant smoke movement mechanisms to be combatted are

(1) operating recirculating air-handling systems,
(2) the expansion process occurring during the initial stages of a fire, and
(3) stack action associated with building heating.

Techniques for Avoiding Widespread Smoke Contamination

Techniques for avoiding widespread smoke contamination in a high building can be divided into the following categories:

(1) Avoidance of any significant fire. The first approach in this category is to exclude or limit combustible materials from a building. Calculations of air movement due to stack effect have indicated that the destruction by fire of very small quantities of combustible material can produce enough smoke to produce untenable conditions in upper floors and vertical shafts of a high building. Limits on the use of smoke producing materials are thus unlikely to be adequate as a sole means of smoke control. Automatic extinguishment of a fire can also be considered as an approach to limiting smoke generation provided the quantity of combustibles destroyed is held within strict limits.

(2) Compartmentation. Where a floor area is divided into a number of fire compartments, the potential size of a fire will be limited to the contents of one compartment. In addition there will be, in some circumstances, dilution of smoke moving from the fire compartment to other floors.

Where the fire occurs below the neutral plane, in cold weather the path of smoke travel may be along a corridor to stairshafts and elevator shafts. In this case the smoke in the corridor will be diluted by clean air coming from other compartments. In an ideal situation (uniform compartments, no expansion and no wind), dilution of the smoke laden air will be in proportion to the number of compartments. Breaking of a window in the fire compartment will, however, increase the pressure in that space and will reduce the effect of dilution.

Where smoke travel occurs through a vertical shaft from a compartment involved in fire to higher compartments, the level of contamination will not be related to the number of units on one floor, but will likely be restricted to units on other floors that are adjacent to the vertical shaft.

The result of compartmentation is, therefore, likely to be beneficial, but does not eliminate the need for smoke control measures.

(3) Location of shafts outside the building envelope. The vertical transfer of smoke to the upper storeys of a building from fire on a lower storey occurs largely by the vertical shafts in the building rather than through the floors, about 95 per cent or more in the case of a typical 20-storey building. Separation of the shafts from the building would thus largely solve the problem. This approach constitutes one of the suggested methods of smoke control.

(4) Dilution. Dilution by a factor of about 100 of the smoke gases issuing from a fire region will provide a tenable atmosphere. This feature could form the basis of a smoke control method, air being injected into the building at appropriate rates at those locations where smoke is being discharged from the fire region into adjacent parts of the building. When cold weather conditions are considered, however, dilution alone is not likely to be very practical. In general, it would be better if the injection of air were directed to modifying the pressure pattern within a building in order to limit any undesirable movement of smoke.

Dilution as a means of reducing smoke contamination should, nevertheless, be considered as an important secondary factor governing a designer's choice of smoke control method. Its importance is in dispersing contamination that might develop as a result of delay in implementing smoke control measures, or of other occurrences such as the opening of a number of doors that might interfere with the operation of a smoke control measure. The amount of air required to dilute a contaminated atmosphere to a tenable level can be calculated approximately. If no mixing were to occur between the contaminated and the clean air, and the contaminated air were to move out ahead of the clean air, one volume of the clean air injected into a compartment would produce a smoke free atmosphere. In practice, however, some mixing does occur. If perfect mixing is assumed in a compartment that has reached a level of contamination equivalent to that of the fire compartment, and no more smoke is entering, the amount of clean air needed to create the one per cent tenable atmosphere discussed would be five times the volume of the compartment. If, however, we are considering a compartment isolated from the fire compartment by a fire separation and self closing doors, it is more reasonable to assume that the level of contamination likely to occur is about one-fifth of that in the fire compartment. In these circumstances, injection of three volumes of clean air would be sufficient to produce a tenable atmosphere. If clean air is injected at the rate of one volume every two minutes, the atmosphere in the compartment would be satisfactory in about six minutes.

These figures are based on the expression

$$c = c_0 e^{-at}$$

where

c_0 = initial concentration of contaminant,
c = final concentration of contaminant,
a = rate of diluent air flow in number of air changes per minute,
t = time in minutes between occurrence of initial and final concentration, and
e = 2.718.

Based on this calculation, assuming perfect mixing of the contaminated air and the diluent air,

c/c_0 = 0.368 after injection of one volume of clean air,
0.135 after injection of two volumes of clean air,
0.050 after injection of three volumes of clean air,
0.018 after injection of four volumes of clean air, and
0.007 after injection of five volumes of clean air.

(5) Adjustment of pressure differential distribution. This category of smoke control technique involves modification of the pressure pattern within the building. The pressure distribution within a building is illustrated by the pressure characteristic diagrams in Figure B-2. The graphs represent, in an exaggerated manner, the pressure differences between floor areas, shafts and exterior at the same height above ground. The pressure difference shown amounts to little more than 500 Pa, whereas the total pressures involved are about 100 kPa. The graphs do relate pressure to heights, and thus cannot be used to determine pressure difference between one floor and another at a different height. Given any set of characteristics as in Figure B-2, the important feature is that, during cold weather, air flow from one region to another at the same level will be towards the region that is at a lower pressure. In the typical building whose characteristics are illustrated, smoke generated at a low level will flow into shafts, up through the shafts and out into floor spaces at the higher levels.

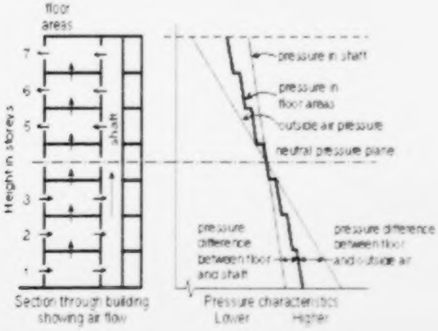
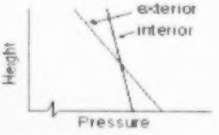

floor areas
7
6
5
3
2
1
Height in storeys
shaft
pressure in shaft
pressure in floor areas
outside air pressure
neutral pressure plane
pressure difference between floor and shaft
pressure difference between floor and outside air
Section through building showing air flow
Pressure characteristics
Lower
Higher

Figure B-2 Pressure characteristics of a typical building

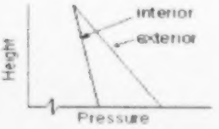
Shafts provide the major paths for the spread of smoke within a building, so one should note the effect of venting on their characteristics. Figure B-3 shows the characteristics of a simple heated shaft under three different venting arrangements, the second and third (Figures B-3(b) and B-3(c)) having obvious advantages in controlling smoke movement in buildings.

In Figure B-3(b) the shaft is vented to the outdoors at the top, and smoke entering the shaft at any level would not leave it until it reached the top opening. If a corresponding condition were established within a building, the shaft would, therefore, not constitute a path for the transmission of smoke from low level to high level floor spaces. In Figure B-3(c) the shaft is vented to the outdoors at the bottom, fresh air enters the shaft at the lowest level and leaves it through any leakage area at any other level in the shaft. Such a condition for a shaft in a building would be most valuable, for as well as being eliminated as a path for smoke dispersal, the shaft also has a clear atmosphere. These conditions, however, may not be sustained long as the atmosphere in the shaft will cool as a result of the influx of cold air, and the characteristic will approach that of the exterior atmosphere. Injection of warm air into the shaft is necessary to maintain these conditions over a prolonged period.

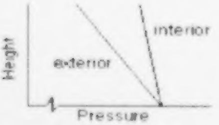
Where a smoke control method is concerned with changing the pressure pattern within a building, many of the measures involved are based on the preceding concept of changing the pressure characteristic of a shaft. Since shafts are the principal paths by which smoke disperses throughout a building, the aim will be either to decrease or to increase shaft pressures substantially. Both measures will eliminate vertical smoke transfer by the shaft between floor spaces. Top venting the shaft as in Figure B-3(b) or use of mechanical exhaust to approach these pressure characteristics will, however, also result in the entry of smoke into the shaft, while pressurizing the shaft, such as by mechanical injection, will maintain a tenable atmosphere in the shaft.



(a) Vented top and bottom



(b) Top vented



(c) Bottom vented

Figure B-3 Shaft characteristics

(6) Smoke shafts. A smoke shaft differs from a vented service shaft in that an opening is provided into the shaft from the fire floor in addition to the opening to the outside at the top of the shaft.

Until windows in outer walls are broken, a smoke shaft alone can be an effective means of limiting movement of smoke into other floors and shafts. In cold weather, the shaft air is warmer than the outdoor air and the shaft will begin to function as a vent as soon as the dampers are opened. During warm weather there will be some delay, as the smoke shaft cannot function as a vent until hot air has entered the shaft as a result of initial expansion in the fire region. The pressure conditions that prevail during cold weather are shown in Figure B-4. The air pressure on the fire floor, having an opening into the smoke shaft, is below that in adjacent unvented shafts and adjacent floor areas. Air flow will be from the adjacent floor areas and shafts into the fire floor, and from the fire floor into the smoke shaft. If, however, a window is broken on a fire floor at a lower level, the air pressure in the fire region will be increased to approximately that of outdoor air at the same level. Smoke may then flow into stairshafts and elevator shafts and adjacent floor areas. During warm weather, breaking of a window will allow venting of smoke to the outdoors for a fire on any floor, except when wind is blowing towards the open window. In this event, breaking of the window will cause the action of the smoke shaft to be overwhelmed. The smoke shaft, therefore, is not fully effective as a sole method of smoke control in a floor area with windows, but can be used in conjunction with building pressurization as part of a smoke control method. The size of a smoke shaft is related to conditions to be established in the event of a fire at a lower level of the building and is dependent on the leakage characteristics of the building. Any increase in the air leakage through the walls of the building and the shafts requires a corresponding increase in the size of the smoke shaft. In Figure B-4 the idealized smoke shaft pressure characteristic is indicated by a dotted line and assumes no pressure losses inside the shaft. As the smoke shaft is open to the outside at the top, pressure at the top level of the smoke shaft is equal to that of outside air.

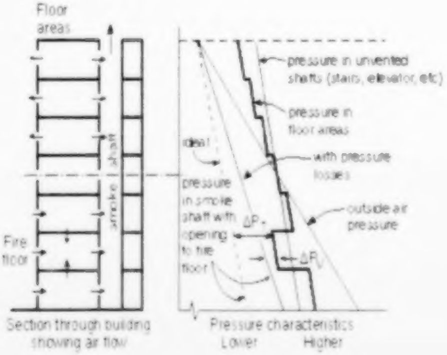

Floor areas
pressure in unvented shafts (stairs, elevator, etc)
pressure in floor areas
ideal
with pressure losses
smoke shaft
pressure in smoke shaft with opening to fire floor
ΔP
outside air pressure
Fire floor
ΔPv
Section through building showing air flow
Pressure characteristics
Lower
Higher

Figure B-4 Pressure differences produced by a smoke shaft

Assuming an air temperature inside a smoke shaft equal to that of the building, as may occur in the case of a small fire, the slope of the smoke shaft pressure characteristic is the same as those of the vented shafts. In Figure B-4 the total pressure (DPT) acting across the vent opening at the bottom is represented by the horizontal distance between floor space and smoke shaft pressure characteristics. The value of DPT is about one half of the total pressure head generated by stack action over the height of the building. The values of DPT are plotted against building height for various outside temperatures in Figure B-5. The movement of air through the smoke shaft causes a decrease in building pressures, which results in the shifting of the floor space pressure characteristic to the left in the pressure diagram. This results in a lower effective value of DPT. The values of DPT have been adjusted to take this factor into account. So far it has been assumed that no pressure losses occur inside the smoke shaft. Friction, momentum and dynamic pressure losses can, however, occur inside the smoke shaft, as a result of air flow through the open vent of the fire floor, as well as through leakage openings in the walls of the smoke shaft. The smoke shaft pressure characteristic including pressure losses is also shown in Figure B-4 as a solid line. The actual pressure difference across the open smoke vent DPv is less than DPT, the difference between the two values representing the pressure losses inside the smoke shaft. The flow requirement to achieve the desired venting action depends on the pressure differences across the fire floor enclosure caused by stack action, and on the air tightness of the various interior and exterior separations of the building. The flow rates shown in Figure B-6 were calculated initially for a 20-storey building having a floor plan measuring 36 m by 36 m, with assumed leakage through walls and floors consistent with the results of air movement measurement obtained in several multi-storey buildings. Extrapolation was made for buildings of various heights, floor areas and outside temperatures using the following relationships:

(1) QV is proportional to FA,
(2) QV is proportional to H [illegible], and
(3) QV is proportional to

$$\frac{(Ti - To)}{To}$$ [illegible]

where

QV is the required flow rate through the floor vent of the smoke shaft,
FA is the flow area of a typical floor,
H is the height of building,
Ti is the indoor absolute temperature, and
To is the outdoor absolute temperature.

A number of other considerations may have to be taken into account in applying measures for control of smoke movement.

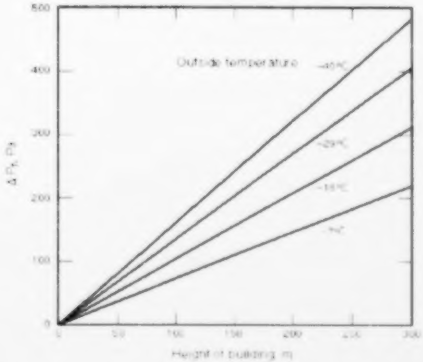


Figure B-5 Available total pressure versus building height

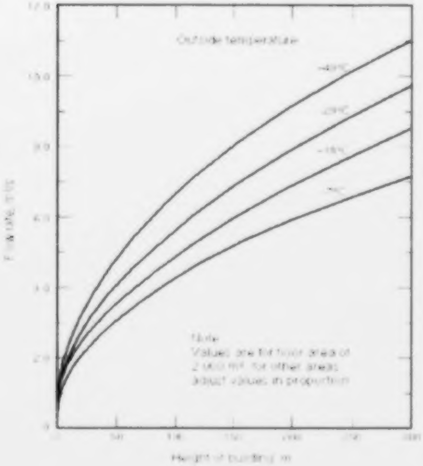


Figure B-6 Required venting capacity of smoke shaft

(7) Make-up air. In the case of smoke control systems that depend on a supply of make-up air from outside the building for pressurization or dilution, the air intakes should be located so that there is little possibility of smoke or other products of combustion being drawn into the air handling system. The source of the smoke could be a fire in the building. The smoke could reach the air intakes as a result of siting the intakes close to the discharge from a smoke shaft or as a result of wind patterns directing smoke that has been vented out through the building envelope towards the intakes. Other sources of smoke are vents from fuel fired equipment, including furnaces and emergency electricity generators, and fire in an adjacent part of a building separated from the building under consideration by fire separations and vestibules, as would occur in the use of Measure K. Air intakes located near ground level should be sited so that exhausts from emergency and other vehicles are not likely to be drawn into the air handling system.

Breaking of Windows on the Fire Floor

Where the room in which a fire occurs has windows, they will probably be broken at a fairly early stage. This will result in a change of pressure in the fire region to substantially that of outdoor air pressure at that level. In Figure B-2, for a fire at a low level in the building during cold weather, breaking of windows will greatly increase the pressure in the region involved. As a result more smoke may be expected to pass into adjacent floors and vertical shafts. This has been taken into consideration in the measures described in Section 2.

Pressures Across Doors

Problems may occur where air pressures across typical hinged doors and sliding elevator doors interfere with their normal use. This may occur when the pressure across a door exceeds 100 Pa. Pressure differences of this magnitude may occur in cold weather where a door communicates with a space that is substantially at outdoor air pressure. This commonly occurs at the entrance doors to high buildings during normal use. The problem is resolved in this case by use of revolving doors or by special hinges which permit the door to rotate about the centre until a sufficient opening is formed to relieve the pressure on the door. It may also occur when windows on a fire floor are broken or where vestibules vented to the outdoors are employed, as in Measure D in Section 2. Situations where such problems may arise are indicated in the explanatory notes to each smoke control measure.

Explosions in Smoke Shafts

An explosion may occur in a smoke shaft during a fire. The maximum over-pressure predicted on the basis of a British report would probably not exceed about 16.5 C. This has been considered, and because it is a somewhat remote possibility, no special precautions are recommended.

Pressure Drop in Stairs

Recent studies have shown that air supply requirements for stairwells with an open door at grade level can cause a substantial pressure drop due to friction. If the air is injected only at the top of particular designs of stairwell in a high building, a non-uniform pressure distribution over the height of the stairshaft may occur. This may produce an undesirably high pressure differential across stairwell doors at high levels. This problem may be avoided by injection of the air at several levels rather than only at the top.

Warm Weather Conditions

The smoke control techniques have been developed to function under cold weather conditions; their performance under warm weather conditions has, however, been carefully considered. Undesirable pressures may be created across certain doors, and certain spaces such as a stairshaft may be contaminated when the door to the outdoors is open. Where air injection is used, modulation of the supply with exterior temperature can be a solution to the problem, although such action reduces the effect of the air supply in diluting transient smoke contamination. Where no interior-exterior temperature differential exists, building heating does not cause stack action and its influence as a smoke movement mechanism disappears. Assuming air handling systems to be shut down, expansion becomes a major factor in spreading smoke throughout a building. Under these conditions the influence of a simple vent opening in an external wall can be readily assessed. Flow through all openings in the walls around the fire region will be roughly in proportion to their area. If the area of the vent to the exterior is ten times the area of the openings communicating to the remainder of the building, only about ten per cent of the displaced smoke laden atmosphere will pass into other parts of the building.

During cold weather, expansion may be responsible for a slight overall increase in pressure of about 25 Pa in the fire region for about 20 minutes.

Appendix C to SB-4

Check of a Smoke Control System

The efficiency of a smoke control system may be checked by measuring pressure differences and the directions of air flow around doors and through separating walls of compartments. A pressure meter can be used to measure pressure differences on either side of a door or partition. Where this is impracticable, a punk stick held near a crack will give an indication of the direction of air flow. Measurements of air flow may be taken on the intake side of supply fans or in supply ducts to determine whether the specified air flow is being provided.

In general, air flow should be from the spaces which may be occupied during a fire emergency (e.g., stairshafts) toward the space in which the fire is assumed to have occurred. For each method of smoke control, measurements may be taken at certain critical locations to check the overall efficiency of the system.

In buildings designed by Measure B, C, D or E, where protection is obtained by venting corridors or vestibules to the outdoors, inspection of the building to determine whether the requirements have been met should be sufficient. In buildings incorporating Measure B, C, D, E, F or G, service shafts may be vented to the outdoors at the top. In this case a check may be made of the wall between the shaft and the uppermost occupied floor areas, to ensure that the direction of flow is from each floor area into the shaft, when the vent to the outside is open and the outdoor air temperature is significantly less than that indoors. In a building incorporating Measure D or E, where mechanically pressurized vestibules are used, and in a building incorporating Measure L, a check may be made to ensure that the pressure in each vestibule or area of refuge is greater than that in the adjacent floor areas at each floor level.

In a building incorporating Measure F or G, the efficiency of a protected elevator shaft can be checked by using a meter to measure pressure differences between the shaft and the outdoors at grade, before and after actuation of the air injection system. The difference between the two readings gives the mechanical pressurization of the shaft, which should be at least equal to one half of the calculated pressure difference caused by stack action over the height of a building for the January design temperature and the design flow rate specified in Sentence (4) of Measure F or Sentence (4) of Measure G. Where the air flow is modulated, the mechanical pressurization should vary between 50 Pa when the outdoor temperature is equal to that indoors, and one half of the pressure difference noted above when the outdoor temperature is equal to the January design temperature. Flow rates into the elevator shaft may be checked against that specified in Sentence (4) of Measure F and Sentence (4) of Measure G. Stairshafts may be checked with the air injection system operating and the door or vent to the outdoors open. Flow rate through the shaft should be equal to that required by Sentence (2) of Measure F and Sentence (2) of Measure G. Top vented service shafts may be checked as described for a building incorporating Measure B, C, D or E.

In a building incorporating Measure H, the efficiency of the system may be checked by measuring pressure differences between floor areas at grade and outdoors before and after actuation of the air injection system. The magnitude of the mechanical pressurization is obtained as described above in the case of elevator shafts in a building incorporating Measure F or G and should be equal to half the pressure difference caused by stack action over the height of the building for the January design temperature and the design flow rate specified in Sentence (2) of Measure H. The effect of modulating air flow for different temperature conditions is also as described for elevator shafts. Flow rates into the building may be checked against those required in Sentence (2) of Measure H. A check may be made on each floor individually, with the air injection system operating and the damper to the smoke shaft or panel to the outdoors open. Under these circumstances, air flow should be from the stairshafts, elevator shafts and service shafts into the floor area that has a damper or panel open.

In a building incorporating Measure I or J, pressure differences should be measured between the central core at grade and a suite that has a number of windows open to the outdoors before and after actuation of the air injection system. The magnitude of mechanical pressurization is obtained as described above in the case of elevator shafts in a building incorporating Measure F or G and should be equal to one half of the pressure difference caused by stack action over the height of the building for the January design temperature and design flow rate specified in Sentence (2) of Measure I. The effect of modulating air flow for different temperature conditions is also as described for elevator shafts. Flow rates into the central core may be checked against those required in Sentence (2) of Measure I.

In a building incorporating Measure K, inspection should indicate whether or not there is a continuous separation between two parts of the building, extending from the roof through storeys below grade. Where pressurized vestibules are used, a check may be made to ensure that the direction of air flow is from each vestibule into adjacent floor areas at each level. The check should also be made on a low level floor with the floor space vents referred to in Sentence (12) of Measure K, or other windows in the two halves of the building open on that floor. This represents the condition when the fire has broken windows in one half of the building and the compensating vent in the other half of the building has been opened manually.

In a building incorporating Measure L, the method of checking is the same as in a building incorporating Measure D or E, except that flow rates into areas of refuge should be measured to ensure that they meet the requirements of Sentence (9) of Measure L.

Doors to stairshafts, elevator shafts and vestibules that are indicated in the notes relating to each measure as being in locations subject to pressure differences that may interfere with normal opening should be checked when the outdoor temperature is near the January design temperature, with the air injection system operating and a number of windows open to the outdoors on each floor in turn.

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Ministry of Municipal Affairs and Housing
Building and Development Branch

Ontario

2006 Building Code - Supplementary Standards

Supplementary Standard SB-5

Approved Sewage Treatment Units

March 9, 2007 update

Supplementary Standard
SB-5

COMMENCEMENT

Supplementary Standard SB-5 comes into force on the 31st day of December, 2006.

m₁ Ruling of the Minister of Municipal Affairs and Housing (Minister's Ruling) MR-07-S-02 takes effect on the 9th day of March, 2007.

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SB-5 Approved Sewage Treatment Units

Table 1
List of Approved Treatment Units Meeting Secondary Effluent Quality Criteria in Table 8.6.2.2.A. of Division B in the 2006 Building Code

Manufacturer/Distributor	Models	References	Comments
Former Aer-O-Flo Budd and Beaver Corp or **C & M Environmental Technologies Inc.** 131 Whitmore Road Unit 13 Woodbridge, Ontario L4L 6E4 Phone: 905-850-3904 Fax: 905-850-3981 Contact: Roy Budd, ext. 222	* Model S-50 * Multi-Flo Models FTB 0.5 FTB 0.6 FTB 0.75 FTB 1 FTB 1.5	MOE letter dated May 14, 1982	appended
Nayadic, Inc. P.O. Box 147 Lightstreet, PA 17839 Phone: 717-784-1653 c/o Former Aer-O-Flo Budd and Beaver Corp or C&M Env. Technologies Contact: Roy Budd (See above)	* Nayadic Models M-6A-F -1900 L/d M-8A-F -2300 L/d M-1050A-F -3000 L/d M-2000A-F -5700 L/d M-6A -1900 L/d M-8A -2300 L/d M-1050A -3000 L/d M-1200A -3785 L/d M-2000A -5700 L/d	MOE letter dated Feb 8, 1993 July 21, 1993	appended appended
Seprotech Systems Inc. (formerly CMS Rotodisk Inc.) 2378 Holly Lane Ottawa, Ontario K1V 7P1 Phone: 613-523-1641 Fax: 613-731-0851 Contact: Cliff Johnson	* Models M30, 75, 125 * Models L250, 400, 500 * Model S-12	MOE letter dated Sept 30, 1981 Oct 2, 1974	appended appended Models: S-12, S-20, S-30, S-40, S-50, M-60, M-75, M-100, M-125, M-150, M-175, M-200, L-250, L-300, L-333, L-400, L-500, L-666, L-833, L-1500 satisfy the MOE requirements set out in the appended letters including CMS letter dated Feb 10, 1998
Column 1	2	3	4

Table 1 (Cont'd)
List of Approved Treatment Units Meeting Secondary Effluent Quality Criteria in Table 8.6.2.2.A. of Division B in the 2006 Building Code

Manufacturer/Distributor	Models	References	Comments
Norweco Equipment Company 220 Republic Street Norwalk OH. 44857 Phone 416-729-3212 419-668-4471 Fax 419-663-5440 Contact M. Price	Singular Model 900 2000 L/d 2850 L/d 3800 L/d 4700 L/d 5700 L/d	MOE letter dated Feb 1, 1994	appended
Orenco Systems Ltd. c/o Onsite Sewage Inc 1801 Bleams Road Kitchener Ontario N2E 3X9 Phone 519-578-0969 Fax 519-745-2085 Contact Walter Crawford	ISF 1010P -1000 L/d ISF 1515P -2275 L/d ISF 2018P -3600 L/d ISF 1036P -3600 L/d	MOE letter dated Sept 12. 1996 June 28. 1996	appended appended
Waterloo Biofilter Systems Inc. 143 Dennis Street P.O. Box 400 Rockwood. ON N0B 2K0 Phone 519-856-0757 Fax 519-856-0759 Contact E. C. Jowett	* Waterloo Biofilter	MOE letter dated June 26. 1996 March 12. 1996	appended appended
Northern Purification Systems 823077 Ontario Inc R.R. #1 2614 Concession 4 Loretto. Ontario L0G 1L0 Phone 905-729-3212 Fax 905-729-4171 Contact Tom Musgrove	* Mono-Pure MP Mono-Pure GC * Cromaglass Models CA-5 CA-10 CA-20	MOE letter dated July 2. 1986	appended
Clearstream Sewage Treatment Systems c/o Northern Purification Systems Contact Tom Musgrove (see above)	* Models 500N -1900 L/d 750N -2800 L/d 1000N -3785 L/d 1500N -5675 L/d	MOE letter dated Nov 17. 1995	appended
Column 1	2	3	4

Table 1 (Cont'd)
List of Approved Treatment Units Meeting Secondary Effluent Quality Criteria in Table 8.6.2.2.A. of Division B in the 2006 Building Code

Manufacturer/Distributor	Models	References	Comments
G'Met Environmental Technologies Ecoflontario (Peat Beds) 234 B. Russell Ave. Ottawa K1N 7X5 Phone: 613-738-2991 Fax: 613-230-9484 Contact: Pierre Gratton	Ecoflo Biofiltration Treatment Unit	MOE letter dated Feb 9, 1998	appended
Whitewater Sewage Treatment Plants c/o Make-Way Environmental Technologies Inc. P.O. Box 1869 Exeter, Ontario N0M 1S7 Phone: 866-625-3929 or 519-235-1176 Fax: 519-235-0570 Contact: Bert Knip	* DF 40 -1500 L/d DF 50, 50A -1890 L/d DF 60 -2270 L/d DF 75 -2840 L/d DF 100 -3780 L/d DF 100A -3780 L/d DF 100B -3780 L/d DF 150 -5670 L/d	MOE letter dated Sept 12, 1996 July 31, 1996	appended appended
Southern Ontario Biocycle Ltd. 280 South Blair St. Whitby, Ontario L1N 9N2 Phone: 905-665-0537 Fax: 905-665-7552 Contact: Jake Rempel	Models: 5800, 2500 L/d	MOE letter dated Feb 19, 1997 Feb 28, 1997	appended appended
Aquarobic Canada P.O. Box 149 Utterson, Ontario P0B 1M0 Phone: 800-452-0144 705-644-1877 Fax: 705-788-9204 Contact: John Reid	Aquarobic Mini Plant, Aquarobic Maxi Plant, Aquarobic Super Maxi Plant	MOE letter dated Sept 15, 1980	appended
Column 1	2	3	4

Table 2
List of Approved Treatment Units Meeting Tertiary Effluent Quality Criteria in Table 8.6.2.2.A. of Division B in the 2006 Building Code
(Approved for Shallow Buried Trenches)

Manufacturer/Distributor	Models	Comments
Norweco Equipment Company 220 Republic Street Norwalk, OH 44857 Phone: 416-729-3212 419-668-4471 Fax: 419-663-5440 Contact: M. Price	**Norweco Singulair Treatment Systems** Models: 960-500-2000 960-750-3000 960-1000-4000 960-1250-4750 960-1500-5700	See attached system descriptions
Orenco Systems Inc. c/o Onsite Sewage Inc. 1801 Bleams Road Kitchener, Ontario N2E 3X9 Phone: 519-578-0969 Fax: 519-745-2085 Contact: Walter Crawford c/o Sand Filtration Inc. 35 A Shirk Place Kitchener, Ontario N2K 1R3 Phone: 519-743-1780 Fax: 519-743-1781	**Orenco Treatment Systems** Models: ISF1111HL, ISF1313HL ISF1515HL, ISF2000HL ISF1616LL, ISF2020LL ISF2222LL, ISF2828LL RSF2010, RSF1615, RSF1818, RSF3210, RSF2018, RSF2020, RSF2220, RSF2420, RSF3216	See attached system descriptions
Waterloo Biofilter Systems Inc. 143 Dennis Street, P.O. Box 400 Rockwood, ON N0B 2K0 Phone: 519-856-0757 Fax: 519-856-0759 Contact: E. C. Jowett	**Waterloo Biofilter Treatment Systems** Models: 11, 16, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100	See attached system descriptions
Northern Purification Systems 823077 Ontario Inc. R.R. #1, 2614 Concession 4 Loretto, Ontario L0G 1L0 Phone: 905-729-3212 Fax: 905-729-4171 Contact: Tom Musgrove	**Clearstream Treatment Systems** Models: 500N 600N 750N 1000N 1500N	See attached system descriptions
m_1 **G*Met Environmental Technologies, Ecoflo Ontario** (Peat Beds) 234 B. Russell Ave. Ottawa, Ontario K1N 7X5 Phone: 613-738-2991 Fax: 613-230-9484 Contact: Pierre Gratton	**Ecoflo Biofilter Treatment Systems** Models: ST-500-PF / STB-500-PF ST-500-GF / STB-500-GF ST-650-PF / STB-650-PF ST-650-GF / STB-650-GF ST-500 MCRI-PF, STB-500 MCRI-PF ST-650 MCRI-PF, STB-650 MCRI-PF	See attached system descriptions
Whitewater Sewage Treatment Plants c/o Make-Way Environmental Technologies Inc. P.O. Box 1869 Exeter, Ontario N0M 1S7 Phone: 866-625-3929 or 519-235-1176 Fax: 519-235-0570 Contact: Bert Knip	**Whitewater Treatment Systems** Models: DF 50 FF, DF 100 FF DF 60 FF, DF 150 FF DF 75 FF, DF 150X2 FF	See attached system descriptions
Column 1	2	3

Table 2 (Cont'd)
List of Approved Treatment Units Meeting Tertiary Effluent Quality Criteria in Table 8.6.2.2.A. of Division B in the 2006 Building Code (Approved for Shallow Buried Trenches)

Manufacturer/Distributor	Models	Comments
Southern Ontario Biocycle Ltd. 280 South Blair St Whitby, Ontario L1N 9N2 Phone 905-665-0537 Fax 905-665-7552 Contact: Jake Rempel	**Biocycle Aerated Wastewater System** Model: 5800-10	See attached system description.
Seprotech Systems Inc. (formerly CMS Rotodisk Inc.) 2378 Holly Lane Ottawa, Ontario K1V 7P1 Phone 613-523-1641 Fax 613-731-0851 Contact: Cliff Johnson	**Rotordisk Wastewater Systems** Model: S12	See attached system description.
Bio-Microbics, Inc. 8450 Cole Pkwy. Shawnee, KS USA 66227 Phone 913-422-0707 or 800-753-3278 Fax 913-422-0808 Contact: R. Peat	**FAST® Wastewater Treatment Systems** Model: MicroFAST® 0.5 Model: MicroFAST® 0.75 Model: MicroFAST® 0.9 Model: MicroFAST® 1.5	See attached system descriptions.
Aquarobic Canada P.O. Box 149 Utterson, Ontario P0B 1M0 Phone 705-644-1877 or 800-452-0144 Fax 705-788-9204 Contact: John Reid	Model MicroMini-28 Model MicroMini-45 Model MiniPlant-70 Model MiniPlant-85	See attached system descriptions.
Nayadic Wastewater Treatment Systems c/o EZFlow Canada 7024 Smith Industrial Drive McGregor, Ontario N0R 1J0 Phone 519-726-6444 Fax 519-726-6211 Contact: Janis Bortolotti or John Winkup	Model M6A Model M8A Model M1050A Model M1200A Model M2000A	See attached system descriptions.
Bionest Technologies Inc. 55, 12e Rue, CP 697 Grand-Mere, Quebec G9T 5L4 Phone 819-538-5662 or 866-538-5662 Fax 819-538-5707 Contact: Marlene Bonneville	**Bionest Treatment Systems** Models BN-400 BN-1000 BN-500 BN-1500 BN-600 BN-2000 BN-750 BN-2650	See attached system descriptions.
Premier Tech Environment 1 Ave. Premier Riviere-du-Loup, Quebec G5R 6C1 Phone 418-867-8883 Fax 418-862-6642 Contact: Michel Lemieux	**Ecoflo Biofilter Treatment Systems Housed in a Concrete Shell** Models ST-500B-PF ST-500B-GF ST-650B-PF ST-650B-GF	See attached system descriptions.
Column 1	2	3

Norweco Singulair® Treatment Systems

Model 960-500-2000

This Norweco Singulair® Treatment Unit is designed for **daily design sanitary sewage flow of 1100 L to 2000 L**. It consists of a treatment unit with a 1.7 m^3 volume baffled pretreatment chamber, a 2.3 m^3 volume aeration chamber equipped with aspirator aerator rated at 1.42 L/s, a 0.95 m^3 settling chamber equipped with sludge return, and a Bio-Kinetic® flow equalization and micro-screening device discharging to a single pass free access sand filter or a dosing pump chamber.

Where the percolation rate of the native subsoil is between 50 min/cm and 125 min/cm, the treatment unit shall include a single pass sand filter consisting of a tank equipped with openings accessible from grade, 100 mm distribution piping, sand filter with an area of 3.4 m^2 and a depth of 450 mm (sand media with 0.4 mm to 1.5 mm dia. effective size with 3 uniformity coefficient); 150 mm pea gravel layer and 100 mm dia. slotted collection piping discharging the effluent by gravity to an effluent dosing chamber.

The dosing chamber consists of a precast concrete effluent dosing pump chamber with 3.5 m^3 volumetric capacity, a minimum 0.3 HP submersible pump, level switches, alarms and control panel and a forcemain discharging the effluent.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of the Norweco Equipment Company and/or its licensed agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Model 960-750-3000

This Norweco Singulair® Treatment Unit is designed for **daily design sanitary sewage flow of 2000 L to 3000 L**. It consists of a treatment unit with a 2.1 m^3 volume baffled pretreatment chamber, a 2.8 m^3 volume aeration chamber equipped with aspirator aerator rated at 1.42 L/s, a 1.1 m^3 settling chamber equipped with sludge return, and a Bio-Kinetic® flow equalization and micro-screening device discharging to a single pass free access sand filter or a dosing pump chamber.

Where the percolation rate of the native subsoil is between 50 min/cm and 125 min/cm, the treatment unit shall include a single pass sand filter consisting of a tank equipped with openings accessible from grade, 100 mm distribution piping, sand filter with an area of 5.1 m^2 and a depth of 450 mm (sand media with 0.4 mm to 1.5 mm dia. effective size with 3 uniformity coefficient); 150 mm pea gravel layer and 100 mm dia. slotted collection piping discharging the effluent by gravity to an effluent dosing chamber.

The dosing chamber consists of a precast concrete effluent dosing pump chamber with 5.5 m^3 volumetric capacity, a minimum 0.3 HP submersible pump, level switches, alarms and control panel and a forcemain discharging the effluent.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of the Norweco Equipment Company and/or its licensed agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Model 960-1000-4000

This Norweco Singulair® Treatment Unit is designed for **daily design sanitary sewage flow of 3000 L to 4000 L**. It consists of a treatment unit with a 3.8 m^3 volume baffled pretreatment chamber; a two (2) cell, 4 m^3 volume aeration chamber equipped with two (2) aspirator aerators, each rated at 1.42 L/s; a 1.0 m^3 settling chamber equipped with sludge return; and two (2) Bio-Kinetic® flow equalization and micro-screening devices discharging to a single pass free access sand filter or a dosing pump chamber.

Where the percolation rate of the native subsoil is between 50 min/cm and 125 min/cm, the treatment unit shall include a single pass sand filter consisting of a tank equipped with openings accessible from grade, 100 mm distribution piping, sand filter with an area of 6.8 m^2 and a depth of 450 mm (sand media with 0.4 mm to 1.5 mm dia. effective size with 3 uniformity coefficient); 150 mm pea gravel layer and 100 mm dia. slotted collection piping discharging the effluent by gravity to an effluent dosing chamber.

The dosing chamber consists of a precast concrete effluent dosing pump chamber with 7.0 m^3 volumetric capacity, a minimum 0.3 HP submersible pump, level switches, alarms and control panel and a forcemain discharging the effluent.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of the Norweco Equipment Company and/or its licensed agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Model 960-1250-4750

This Norweco Singulair® Treatment Unit is designed for **daily design sanitary sewage flow of 4000 L to 4750 L**. It consists of a treatment unit with a 4.75 m^3 volume baffled pretreatment chamber; a two (2) cell, 4.9 m^3 volume aeration chamber equipped with two (2) aspirator aerators, each rated at 1.42 L/s; a 1.14 m^3 settling chamber equipped with two (2) sludge returns; and three (3) Bio-Kinetic® flow equalization and micro-screening devices discharging to a single pass free access sand filter or a dosing pump chamber.

Where the percolation rate of the native subsoil is between 50 min/cm and 125 min/cm, the treatment unit shall include a single pass sand filter consisting of a tank equipped with openings accessible from grade, 100 mm distribution piping, sand filter with an area of 8.1 m^2 and a depth of 450 mm (sand media with 0.4 mm to 1.5 mm dia. effective size with 3 uniformity coefficient); 150 mm pea gravel layer and 100 mm dia. slotted collection piping discharging the effluent by gravity to an effluent dosing chamber.

The dosing chamber consists of a precast concrete effluent dosing pump chamber with 8.3 m^3 volumetric capacity, a minimum 0.3 HP submersible pump, level switches, alarms and control panel and a forcemain discharging the effluent.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of the Norweco Equipment Company and/or its licensed agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Model 960-1500-5700

This Norweco Singulair® Treatment Unit is designed for **daily design sanitary sewage flow of 4750 L to 5700 L**. It consists of a treatment unit with a 5.7 m^3 volume baffled pretreatment chamber; a two (2) cell, 5.9 m^3 volume aeration chamber equipped with two (2) aspirator aerators, each rated at 1.42 L/s; a 1.32 m^3 settling chamber equipped with two (2) sludge returns; and three (3) Bio-Kinetic® flow equalization and micro-screening devices discharging to a single pass free access sand filter or a dosing pump chamber.

Where the percolation rate of the native subsoil is between 50 min/cm and 125 min/cm, the treatment unit shall include a single pass sand filter consisting of a tank equipped with openings accessible from grade, 100 mm distribution piping, sand filter with an area of 9.7 m^2 and a depth of 450 mm (sand media with 0.4 mm to 1.5 mm dia. effective size with 3 uniformity coefficient); 150 mm pea gravel layer and 100 mm dia. slotted collection piping discharging the effluent by gravity to an effluent dosing chamber.

The dosing chamber consists of a precast concrete effluent dosing pump chamber with 9.9 m^3 volumetric capacity, a minimum 0.3 HP submersible pump, level switches, alarms and control panel and a forcemain discharging the effluent.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of the Norweco Equipment Company and/or its licensed agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Orenco Treatment Systems

High Load Intermittent Sand Filter Systems:

Model ISF1111HL

This Orenco Treatment Unit is designed for **daily design sanitary sewage flow of up to 1100 L**. The system requires a standard septic tank with minimum volume of 4400 L, complete with an effluent filter on the outlet to screen out particles larger than 3 mm, overflowing to a pump chamber.

The pump chamber has a minimum nominal diameter of 380 mm and a minimum effective depth of 1200 mm. It is equipped with a minimum 0.5 **HP** effluent dosing pump, complete with level switches, alarm and control panel, discharging to a sand filter.

The sand filter has an area of 11.25 m^2, is contained in a 30 mil PVC liner and it is designed to have a hydraulic loading rate no greater than 100 L/m^2/day. It includes a pressure distribution manifold, with laterals of a minimum 25 mm dia. pressure pipe, centered at 360 mm. The pipes have 3 mm dia. orifices, centered at 600 mm. The pipes are covered with a 150 mm layer of 9 mm washed pea stone and with cold weather shields. The layer of stone is underlaid by 600 mm of high load filter media. The filter media conforms to the following sieve sizing: #3/8: 100% passing; #4: 77-100% passing; #8: 53-100% passing; #16: 15-80% passing; #30: 3-50% passing; #50: 0-1% passing; #100: 0-1% passing; #200: 0-1% with D_{10} = 0.4 to 0.9 mm and C_u = 1 to 4. The sand filter media is underlaid by 150 mm of 19 mm clear stone containing a 100 mm dia., slotted drainage pipe discharging to a dosing pump chamber.

The dosing chamber has a minimum of 380 mm nominal dia. and a minimum of 900 mm effective depth. It is equipped with a minimum 0.5 **HP** effluent pump, level switches, alarms and control panel, discharging the effluent at controlled intervals.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of the Orenco Systems Inc. and/or its licensed agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Model ISF1313HL

This Orenco Treatment Unit is designed for **daily design sanitary sewage flow of up to 1600 L**. The system requires a standard septic tank with minimum volume of 6400 L, complete with an effluent filter on the outlet to screen out particles larger than 3 mm, overflowing to a pump chamber.

The pump chamber has a minimum nominal diameter of 380 mm and a minimum effective depth of 1200 mm. It is equipped with a minimum 0.5 **HP** effluent dosing pump, complete with level switches, alarm and control panel, discharging to a sand filter.

The sand filter has an area of 15.71 m^2, is contained in a 30 mil PVC liner and it is designed to have a hydraulic loading rate no greater than 100 L/m^2/day. It includes a pressure distribution manifold, with laterals of a minimum 25 mm dia. pressure pipe, centered at 360 mm. The pipes have 3 mm dia. orifices, centered at 600 mm. The pipes are covered with a 150 mm layer of 9 mm washed pea stone and with cold weather shields. The layer of stone is underlaid by 600 mm of high load filter media. The filter media conforms to the following sieve sizing: #3/8: 100% passing; #4: 77-100% passing; #8: 53-100% passing; #16: 15-80% passing; #30: 3-50% passing; #50: 0-1% passing; #100: 0-1% passing; #200: 0-1% with D_{10} = 0.4 to 0.9 mm and C_u = 1 to 4. The sand filter media is underlaid by 150 mm of 19 mm clear stone containing a 100 mm dia., slotted drainage pipe discharging to a dosing pump chamber.

The dosing chamber has a minimum of 380 mm nominal dia. and a minimum of 900 mm effective depth. It is equipped with a minimum 0.5 HP effluent pump, level switches, alarms and control panel, discharging the effluent at controlled intervals.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of the Orenco Systems Inc. and/or its licensed agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Model ISF1515HL

This Orenco Treatment Unit is designed for **daily design sanitary sewage flow of up to 2000 L**. The system requires a standard septic tank with minimum volume of 8000 L, complete with a physical filter on the outlet to screen out particles larger than 3 mm, overflowing to a pump chamber.

The pump chamber has a minimum nominal diameter of 380 mm and a minimum effective depth of 1200 mm. It is equipped with a minimum 0.5 HP effluent dosing pump, complete with level switches, alarm and control panel, discharging to a sand filter.

The sand filter has an area of 29.91 m^2, is contained in a 30 mil PVC liner and it is designed to have a hydraulic loading rate no greater than 100 L/m^2/day. It includes a pressure distribution manifold, with laterals of a minimum 25 mm dia. pressure pipe, centered at 360 mm. The pipes have 3 mm dia. orifices, centered at 600 mm. The pipes are covered with a 150 mm layer of 9 mm washed pea stone and with cold weather shields. The layer of stone is underlaid by 600 mm of high load filter media. The filter media conforms to the following sieve sizing: #3/8: 100% passing; #4: 77-100% passing; #8: 53-100% passing; #16: 15-80% passing; #30: 3-50% passing; #50: 0-1% passing; #100: 0-1% passing; #200: 0-1% with D_{10} = 0.4 to 0.9 mm and C_u = 1 to 4. The sand filter media is underlaid by 150 mm of 19 mm clear stone containing a 100 mm dia., slotted drainage pipe discharging to a dosing pump chamber.

The dosing chamber has a minimum of 380 mm nominal dia. and a minimum of 900 mm effective depth. It is equipped with a minimum 0.5 HP effluent pump, level switches, alarms and control panel, discharging the effluent at controlled intervals.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of the Orenco Systems Inc. and/or its licensed agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Model ISF2000HL

This Orenco Treatment Unit is designed for **daily design sanitary sewage flow of 2000 L to 10 000 L**. The system requires a standard septic tank with minimum volume of four times the daily design sanitary sewage flow, complete with an effluent filter on the outlet to screen out particles larger than 3 mm, overflowing to a pump chamber.

The pump chamber has a minimum nominal diameter of 380 mm and a minimum effective depth of 1200 mm. It is equipped with a minimum 0.5 HP effluent dosing pump, complete with level switches, alarm and control panel, discharging to a sand filter.

The sand filter is contained in a 30 mil PVC liner and it is designed to have a hydraulic loading rate no greater than 100 L/m^2/day. It includes a pressure distribution manifold, with laterals of a minimum 25 mm dia. pressure pipe, centered at 360 mm. The pipes have 3 mm dia. orifices, centered at 600 mm. The pipes are covered with a 150 mm layer of 9 mm washed pea stone and with cold weather shields. The layer of stone is underlaid by 600 mm of high load filter media. The filter media conforms to the following sieve sizing: #3/8: 100% passing; #4: 77-100% passing; #8: 53-100% passing; #16: 15-80% passing; #30: 3-50% passing; #50: 0-1% passing; #100: 0-1% passing; #200: 0-1% with D_{10} = 0.4 to 0.9 mm and C_u = 1 to 4. The sand filter media is underlaid by 150 mm of 19 mm clear stone containing a 100 mm dia., slotted drainage pipe discharging to a dosing pump chamber.

The dosing chamber has a minimum of 380 mm nominal dia. and a minimum of 900 mm effective depth. It is equipped with a minimum 0.5 HP effluent pump, level switches, alarms and control panel, discharging the effluent at controlled intervals.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of the Orenco Systems Inc. and/or its licensed agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Low Load Intermittent Sand Filter Systems:

Model ISF1616LL

This Orenco Treatment Unit is designed for **daily design sanitary sewage flow of up to 1100 L**. The system requires a standard septic tank with minimum volume of 4400 L, complete with an effluent filter on the outlet to screen out particles larger than 3 mm, overflowing to a pump chamber.

The pump chamber has a minimum nominal diameter of 380 mm and a minimum effective depth of 1200 mm. It is equipped with a minimum 0.5 HP effluent dosing pump, complete with level switches, alarm and control panel, discharging to a sand filter.

The sand filter has an area of 23.79 m^2, is contained in a 30 mil PVC liner and it is designed to have a hydraulic loading rate no greater than 50 L/m^2/day. It includes a pressure distribution manifold, with laterals of a minimum 25 mm dia. pressure pipe, centered at 600 mm. The pipes have 3 mm dia. orifices, centered at 600 mm. The pipes are covered with a 150 mm layer of 9 mm washed pea stone and with cold weather shields. The layer of stone is underlaid by 600 mm of high load filter media. The filter media conforms to the following sieve sizing: #3/8: 100% passing; #4: 95-100% passing; #8: 80-100% passing; #16: 45-85% passing; #30: 15-60% passing; #50: 3-10% passing; #100: 0-2% passing; #200: 0-1% passing with D_{10} = 0.3 to 0.5 mm and C_u = 1 to 4. The sand filter media is underlaid by 150 mm of 19 mm clear stone containing a 100 mm dia., slotted drainage pipe discharging to a dosing pump chamber.

The dosing chamber has a minimum of 380 mm nominal dia. and a minimum of 900 mm effective depth. It is equipped with a minimum 0.5 HP effluent pump, level switches, alarms and control panel, discharging the effluent at controlled intervals.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

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Model ISF2020LL

This Orenco Treatment Unit is designed for **daily design sanitary sewage flow of up to 1600 L**. The system requires a standard septic tank with minimum volume of 6400 L, complete with an effluent filter on the outlet to screen out particles larger than 3 mm, overflowing to a pump chamber.

The pump chamber has a minimum nominal diameter of 380 mm and a minimum effective depth of 1200 mm. It is equipped with a minimum 0.5 HP effluent dosing pump, complete with level switches, alarm and control panel, discharging to a sand filter.

The sand filter has an area of 37.17 m^2, is contained in a 30 mil PVC liner and it is designed to have a hydraulic loading rate no greater than 50 L/m^2/day. It includes a pressure distribution manifold, with laterals of a minimum 25 mm dia. pressure pipe, centered at 600 mm. The pipes have 3 mm dia. orifices, centered at 600 mm. The pipes are covered with a 150 mm layer of 9 mm washed pea stone and with cold weather shields. The layer of stone is underlaid by 600 mm of high load filter media. The filter media conforms to the following sieve sizing: #3/8: 100% passing; #4: 95-100% passing; #8: 80-100% passing; #16: 45-85% passing; #30: 15-60% passing; #50: 3-10% passing; #100: 0-2% passing; #200: 0-1% passing with D_{10} = 0.3 to 0.5 mm and C_u = 1 to 4. The sand filter media is underlaid by 150 mm of 19 mm clear stone containing a 100 mm dia., slotted drainage pipe discharging to a dosing pump chamber.

The dosing chamber has a minimum of 380 mm nominal dia. and a minimum of 900 mm effective depth. It is equipped with a minimum 0.5 HP effluent pump, level switches, alarms and control panel, discharging the effluent at controlled intervals.

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Model ISF2222LL

This Orenco Treatment Unit is designed for **daily design sanitary sewage flow of up to 2000 L**. The system requires a standard septic tank with minimum volume of 8000 L, complete with an effluent filter on the outlet to screen out particles larger than 3 mm, overflowing to a pump chamber.

The pump chamber has a minimum nominal diameter of 380 mm and a minimum effective depth of 1200 mm. It is equipped with a minimum 0.5 HP effluent dosing pump, complete with level switches, alarm and control panel, discharging to a sand filter.

The sand filter has an area of 44.98 m^2, is contained in a 30 mil PVC liner and it is designed to have a hydraulic loading rate no greater than 50 L/m^2/day. It includes a pressure distribution manifold, with laterals of a minimum 25 mm dia. pressure pipe, centered at 600 mm. The pipes have 3 mm dia. orifices, centered at 600 mm. The pipes are covered with a 150 mm layer of 9 mm washed pea stone and with cold weather shields. The layer of stone is underlaid by 600 mm of high load filter media. The filter media conforms to the following sieve sizing: #3/8: 100% passing; #4: 95-100% passing; #8: 80-100% passing; #16: 45-85% passing; #30: 15-60% passing; #50: 3-10% passing; #100: 0-2% passing; #200: 0-1% passing with D_{10} = 0.3 to 0.5 mm and C_u = 1 to 4. The sand filter media is underlaid by 150 mm of 19 mm clear stone containing a 100 mm dia., slotted drainage pipe discharging to a dosing pump chamber.

The dosing chamber has a minimum of 380 mm nominal dia. and a minimum of 900 mm effective depth. It is equipped with a minimum 0.5 HP effluent pump, level switches, alarms and control panel, discharging the effluent at controlled intervals.

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Model ISF2828LL

This Orenco Treatment Unit is designed for **daily design sanitary sewage flow of up to 3600 L**. The system requires a standard septic tank with minimum volume of 14 400 L, complete with an effluent filter on the outlet to screen out particles larger than 3 mm, overflowing to a pump chamber.

The pump chamber has a minimum nominal diameter of 380 mm and a minimum effective depth of 1200 mm. It is equipped with a minimum 0.5 HP effluent dosing pump, complete with level switches, alarm and control panel, discharging to a sand filter.

The sand filter has an area of 72.86 m^2, is contained in a 30 mil PVC liner and it is designed to have a hydraulic loading rate no greater than 50 $L/m^2/day$. It includes a pressure distribution manifold, with laterals of a minimum 25 mm dia. pressure pipe, centered at 600 mm. The pipes have 3 mm dia. orifices, centered at 600 mm. The pipes are covered with a 150 mm layer of 9 mm washed pea stone and with cold weather shields. The layer of stone is underlaid by 600 mm of high load filter media. The filter media conforms to the following sieve sizing: #3/8: 100% passing; #4: 95-100% passing; #8: 80-100% passing; #16: 45-85% passing; #30: 15-60% passing; #50: 3-10% passing; #100: 0-2% passing; #200: 0-1% passing with D_{10} = 0.3 to 0.5 mm and C_u = 1 to 4. The sand filter media is underlaid by 150 mm of 19 mm clear stone containing a 100 mm dia., slotted drainage pipe discharging to a dosing pump chamber.

The dosing chamber has a minimum of 380 mm nominal dia. and a minimum of 900 mm effective depth. It is equipped with a minimum 0.5 HP effluent pump, level switches, alarms and control panel, discharging the effluent at controlled intervals.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

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Recirculating Sand Filter Systems:

Model RSF2010

This Orenco Treatment Unit is designed for **daily design sanitary sewage flow of up to 3800 L**. The system requires a standard septic tank with minimum volume of 11 400 L, complete with an effluent filter on the outlet to screen out particles larger than 3 mm, overflowing to a pump chamber.

The pump chamber has a minimum nominal diameter of 380 mm and a minimum effective depth of 1200 mm. It is equipped with a minimum 0.5 HP effluent dosing pump, complete with level switches, alarm and control panel, discharging to a recirculating tank.

The recirculating tank has a minimum volume of 3.8 m^3, and includes a pump vault having a minimum of 380 mm dia. and a minimum of 1200 mm effective depth. It is equipped with a minimum 0.5 HP dosing pump complete with level switches, alarm and control panel, discharging effluent to a recirculating sand filter. It is also equipped with a recirculating splitter valve that discharges 20% of flow to a dosing tank and 80% of flow back to the recirculating tank. The tank is equipped with a physical filter to screen out solids larger than 3 mm.

The recirculating sand filter has an area of 9.5 m^2, is contained in a 30 mil PVC liner and it is designed to have a hydraulic loading rate no greater than 200 L/m^2/day. It includes a pressure distribution manifold, with laterals of a minimum 25 mm dia. pressure pipe, centered at 600 mm. The pipes have 3 mm dia. orifices, centered at 600 mm. The pipes are covered with a 150 mm layer of 9 mm washed pea stone and with cold weather shields. The layer of stone is underlaid by 600 mm of high load filter media. The filter media conforms to the following sieve sizing: #3/8: 100% passing; #4: 70-100% passing; #8: 5-78% passing; #16: 0-4% passing; #30: 0-2% passing; #50: 0-1% passing; #100: 0-1% passing; #200: 0-1% passing with D_{10} = 1.5 to 2.5 mm and C_u = 1 to 3. The sand filter media is underlaid by 150 mm of 19 mm clear stone containing a 100 mm dia., slotted drainage pipe discharging to a flow splitter valve in the recirculation tank.

The dosing tank has a minimum volume of 1.2 m^3, and includes a pump vault having a minimum of 380 mm dia. and a minimum of 1200 mm effective depth. It is equipped with a minimum 0.5 HP effluent pump, level switches, alarms and control panel, discharging the effluent at controlled intervals. The tank is equipped with a physical filter to screen out solids larger than 3 mm.

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Model RSF1615

This Orenco Treatment Unit is designed for **daily design sanitary sewage flow of up to 4500 L**. The system requires a standard septic tank with minimum volume of 13 500 L, complete with an effluent filter on the outlet to screen out particles larger than 3 mm, overflowing to a pump chamber.

The pump chamber has a minimum nominal diameter of 380 mm and a minimum effective depth of 1200 mm. It is equipped with a minimum 0.5 HP effluent dosing pump, complete with level switches, alarm and control panel, discharging to a recirculating tank.

The recirculating tank has a minimum volume of 4.5 m^3, and includes a pump vault having a minimum of 380 mm dia. and a minimum of 1200 mm effective depth. It is equipped with a minimum 0.5 HP dosing pump complete with level switches, alarm and control panel, discharging effluent to a recirculating sand filter. It is also equipped with a recirculating splitter valve that discharges 20% of flow to a dosing tank and 80% of flow back to the recirculating tank. The tank is equipped with a physical filter to screen out solids larger than 3 mm.

The recirculating sand filter has an area of 11.25 m^2, is contained in a 30 mil PVC liner and it is designed to have a hydraulic loading rate no greater than 200 L/m^2/day. It includes a pressure distribution manifold, with laterals of a minimum 25 mm dia. pressure pipe, centered at 600 mm. The pipes have 3 mm dia. orifices, centered at 600 mm. The pipes are covered with a 150 mm layer of 9 mm washed pea stone and with cold weather shields. The layer of stone is underlaid by 600 mm of high load filter media. The filter media conforms to the following sieve sizing: #3/8: 100% passing; #4: 70-100% passing; #8: 5-78% passing; #16: 0-4% passing; #30: 0-2% passing; #50: 0-1% passing; #100: 0-1% passing; #200: 0-1% passing with D_{10} = 1.5 to 2.5 mm and C_u = 1 to 3. The sand filter media is underlaid by 150 mm of 19 mm clear stone containing a 100 mm dia., slotted drainage pipe discharging to a flow splitter valve in the recirculation tank.

The dosing tank has a minimum volume of 1.2 m^3, and includes a pump vault having a minimum of 380 mm dia. and a minimum of 1200 mm effective depth. It is equipped with a minimum 0.5 HP effluent pump, level switches, alarms and control panel, discharging the effluent at controlled intervals. The tank is equipped with a physical filter to screen out solids larger than 3 mm.

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Model RSF1818

This Orenco Treatment Unit is designed for **daily design sanitary sewage flow of up to 5700 L**. The system requires a standard septic tank with minimum volume of 17 100 L, complete with an effluent filter on the outlet to screen out particles larger than 3 mm, overflowing to a pump chamber.

The pump chamber has a minimum nominal diameter of 380 mm and a minimum effective depth of 1200 mm. It is equipped with a minimum 0.5 HP effluent dosing pump, complete with level switches, alarm and control panel, discharging to a recirculating tank.

The recirculating tank has a minimum volume of 5.7 m^3, and includes a pump vault having a minimum of 380 mm dia. and a minimum of 1200 mm effective depth. It is equipped with a minimum 0.5 HP dosing pump complete with level switches, alarm and control panel, discharging effluent to a recirculating sand filter. It is also equipped with a recirculating splitter valve that discharges 20% of flow to a dosing tank and 80% of flow back to the recirculating tank. The tank is equipped with a physical filter to screen out solids larger than 3 mm.

The recirculating sand filter has an area of 14.5 m^2, is contained in a 30 mil PVC liner and it is designed to have a hydraulic loading rate no greater than 200 $L/m^2/day$. It includes a pressure distribution manifold, with laterals of a minimum 25 mm dia. pressure pipe, centered at 600 mm. The pipes have 3 mm dia. orifices, centered at 600 mm. The pipes are covered with a 150 mm layer of 9 mm washed pea stone and with cold weather shields. The layer of stone is underlaid by 600 mm of high load filter media. The filter media conforms to the following sieve sizing: #3/8: 100% passing; #4: 70-100% passing; #8: 5-78% passing; #16: 0-4% passing; #30: 0-2% passing; #50: 0-1% passing; #100: 0-1% passing; #200: 0-1% passing with D_{10} = 1.5 to 2.5 mm and C_u = 1 to 3. The sand filter media is underlaid by 150 mm of 19 mm clear stone containing a 100 mm dia., slotted drainage pipe discharging to a flow splitter valve in the recirculation tank.

The dosing tank has a minimum volume of 2.0 m^3, and includes a pump vault having a minimum of 380 mm dia. and a minimum of 1200 mm effective depth. It is equipped with a minimum 0.5 HP effluent pump, level switches, alarms and control panel, discharging the effluent at controlled intervals. The tank is equipped with a physical filter to screen out solids larger than 3 mm.

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Model RSF3210

This Orenco Treatment Unit is designed for **daily design sanitary sewage flow of up to 6100 L**. The system requires a standard septic tank with minimum volume of 18 300 L, complete with an effluent filter on the outlet to screen out particles larger than 3 mm, overflowing to a pump chamber.

The pump chamber has a minimum nominal diameter of 380 mm and a minimum effective depth of 1200 mm. It is equipped with a minimum 0.5 **HP** effluent dosing pump, complete with level switches, alarm and control panel, discharging to a recirculating tank.

The recirculating tank has a minimum volume of 6.1 m^3, and includes a pump vault having a minimum of 380 mm dia. and a minimum of 1200 mm effective depth. It is equipped with a minimum 0.5 **HP** dosing pump complete with level switches, alarm and control panel, discharging effluent to a recirculating sand filter. It is also equipped with a recirculating splitter valve that discharges 20% of flow to a dosing tank and 80% of flow back to the recirculating tank. The tank is equipped with a physical filter to screen out solids larger than 3 mm.

The recirculating sand filter has an area of 15.25 m^2, is contained in a 30 mil PVC liner and it is designed to have a hydraulic loading rate no greater than 200 L/m^2/day. It includes a pressure distribution manifold, with laterals of a minimum 25 mm dia. pressure pipe, centered at 600 mm. The pipes have 3 mm dia. orifices, centered at 600 mm. The pipes are covered with a 150 mm layer of 9 mm washed pea stone and with cold weather shields. The layer of stone is underlaid by 600 mm of high load filter media. The filter media conforms to the following sieve sizing: #3/8: 100% passing; #4: 70-100% passing; #8: 5-78% passing; #16: 0-4% passing; #30: 0-2% passing; #50: 0-1% passing; #100: 0-1% passing; #200: 0-1% passing with D_{10} = 1.5 to 2.5 mm and C_u = 1 to 3. The sand filter media is underlaid by 150 mm of 19 mm clear stone containing a 100 mm dia., slotted drainage pipe discharging to a flow splitter valve in the recirculation tank.

The dosing tank has a minimum volume of 2.0 m^3, and includes a pump vault having a minimum of 380 mm dia. and a minimum of 1200 mm effective depth. It is equipped with a minimum 0.5 **HP** effluent pump, level switches, alarms and control panel, discharging the effluent at controlled intervals. The tank is equipped with a physical filter to screen out solids larger than 3 mm.

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Model RSF2018

This Orenco Treatment Unit is designed for **daily design sanitary sewage flow of up to 6800 L**. The system requires a standard septic tank with minimum volume of 20 400 L, complete with an effluent filter on the outlet to screen out particles larger than 3 mm, overflowing to a pump chamber.

The pump chamber has a minimum nominal diameter of 380 mm and a minimum effective depth of 1200 mm. It is equipped with a minimum 0.5 **HP** effluent dosing pump, complete with level switches, alarm and control panel, discharging to a recirculating tank.

The recirculating tank has a minimum volume of 6.8 m^3, and includes a pump vault having a minimum of 380 mm dia. and a minimum of 1200 mm effective depth. It is equipped with a minimum 0.5 **HP** dosing pump complete with level switches, alarm and control panel, discharging effluent to a recirculating sand filter. It is also equipped with a recirculating splitter valve that discharges 20% of flow to a dosing tank and 80% of flow back to the recirculating tank. The tank is equipped with a physical filter to screen out solids larger than 3 mm.

The recirculating sand filter has an area of 17.0 m^2, is contained in a 30 mil PVC liner and it is designed to have a hydraulic loading rate no greater than 200 L/m^2/day. It includes a pressure distribution manifold, with laterals of a minimum 25 mm dia. pressure pipe, centered at 600 mm. The pipes have 3 mm dia. orifices, centered at 600 mm. The pipes are covered with a 150 mm layer of 9 mm washed pea stone and with cold weather shields. The layer of stone is underlaid by 600 mm of high load filter media. The filter media conforms to the following sieve sizing: #3/8: 100% passing; #4: 70-100% passing; #8: 5-78% passing; #16: 0-4% passing; #30: 0-2% passing; #50: 0-1% passing; #100: 0-1% passing; #200: 0-1% passing with D_{10} = 1.5 to 2.5 mm and C_u = 1 to 3. The sand filter media is underlaid by 150 mm of 19 mm clear stone containing a 100 mm dia., slotted drainage pipe discharging to a flow splitter valve in the recirculation tank.

The dosing tank has a minimum volume of 2.3 m^3, and includes a pump vault having a minimum of 380 mm dia. and a minimum of 1200 mm effective depth. It is equipped with a minimum 0.5 HP effluent pump, level switches, alarms and control panel, discharging the effluent at controlled intervals. The tank is equipped with a physical filter to screen out solids larger than 3 mm.

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Model RSF2020

This Orenco Treatment Unit is designed for **daily design sanitary sewage flow of up to 7600 L**. The system requires a standard septic tank with minimum volume of 22 800 L, complete with an effluent filter on the outlet to screen out particles larger than 3 mm, overflowing to a pump chamber.

The pump chamber has a minimum nominal diameter of 380 mm and a minimum effective depth of 1200 mm. It is equipped with a minimum 0.5 HP effluent dosing pump, complete with level switches, alarm and control panel, discharging to a recirculating tank.

The recirculating tank has a minimum volume of 7.6 m^3, and includes a pump vault having a minimum of 380 mm dia. and a minimum of 1200 mm effective depth. It is equipped with a minimum 0.5 HP dosing pump complete with level switches, alarm and control panel, discharging effluent to a recirculating sand filter. It is also equipped with a recirculating splitter valve that discharges 20% of flow to a dosing tank and 80% of flow back to the recirculating tank. The tank is equipped with a physical filter to screen out solids larger than 3 mm.

The recirculating sand filter has an area of 19.0 m^2, is contained in a 30 mil PVC liner and it is designed to have a hydraulic loading rate no greater than 200 L/m^2/day. It includes a pressure distribution manifold, with laterals of a minimum 25 mm dia. pressure pipe, centered at 600 mm. The pipes have 3 mm dia. orifices, centered at 600 mm. The pipes are covered with a 150 mm layer of 9 mm washed pea stone and with cold weather shields. The layer of stone is underlaid by 600 mm of high load filter media. The filter media conforms to the following sieve sizing: #3/8: 100% passing; #4: 77-100% passing; #8: 5-78% passing; #16: 0-4% passing; #30: 0-2% passing; #50: 0-1% passing; #100: 0-1% passing; #200: 0-1% passing with D_{10} = 1.5 to 2.5 mm and C_u = 1 to 3. The sand filter media is underlaid by 150 mm of 19 mm clear stone containing a 100 mm dia., slotted drainage pipe discharging to a flow splitter valve in the recirculation tank.

The dosing tank has a minimum volume of 2.5 m^3, and includes a pump vault having a minimum of 380 mm dia. and a minimum of 1200 mm effective depth. It is equipped with a minimum 0.5 HP effluent pump, level switches, alarms and control panel, discharging the effluent at controlled intervals. The tank is equipped with a physical filter to screen out solids larger than 3 mm.

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Model RSF2220

This Orenco Treatment Unit is designed for **daily design sanitary sewage flow of up to 8300 L**. The system requires a standard septic tank with minimum volume of 25 000 L, complete with an effluent filter on the outlet to screen out particles larger than 3 mm, overflowing to a pump chamber.

The pump chamber has a minimum nominal diameter of 380 mm and a minimum effective depth of 1200 mm. It is equipped with a minimum 0.5 **HP** effluent dosing pump, complete with level switches, alarm and control panel, discharging to a recirculating tank.

The recirculating tank has a minimum volume of 8.3 m^3, and includes a pump vault having a minimum of 380 mm dia. and a minimum of 1200 mm effective depth. It is equipped with a minimum 0.5 **HP** dosing pump complete with level switches, alarm and control panel, discharging effluent to a recirculating sand filter. It is also equipped with a recirculating splitter valve that discharges 20% of flow to a dosing tank and 80% of flow back to the recirculating tank. The tank is equipped with a physical filter to screen out solids larger than 3 mm.

The recirculating sand filter has an area of 20.75 m^2, is contained in a 30 mil PVC liner and it is designed to have a hydraulic loading rate no greater than 200 L/m^2/day. It includes a pressure distribution manifold, with laterals of a minimum 25 mm dia. pressure pipe, centered at 600 mm. The pipes have 3 mm dia. orifices, centered at 600 mm. The pipes are covered with a 150 mm layer of 9 mm washed pea stone and with cold weather shields. The layer of stone is underlaid by 600 mm of high load filter media. The filter media conforms to the following sieve sizing: #3/8: 100% passing; #4: 77-100% passing; #8: 5-78% passing; #16: 0-4% passing; #30: 0-2% passing; #50: 0-1% passing; #100: 0-1% passing; #200: 0-1% passing with D_{10} = 1.5 to 2.5 mm and C_u = 1 to 3. The sand filter media is underlaid by 150 mm of 19 mm clear stone containing a 100 mm dia., slotted drainage pipe discharging to a flow splitter valve in the recirculation tank.

The dosing tank has a minimum volume of 8.3 m^3, and includes a pump vault having a minimum of 380 mm dia. and a minimum of 1200 mm effective depth. It is equipped with a minimum 0.5 **HP** effluent pump, level switches, alarms and control panel, discharging the effluent at controlled intervals. The tank is equipped with a physical filter to screen out solids larger than 3 mm.

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Model RSF2420

This Orenco Treatment Unit is designed for **daily design sanitary sewage flow of up to 9100 L**. The system requires a standard septic tank with minimum volume of 27 300 L, complete with an effluent filter on the outlet to screen out particles larger than 3 mm, overflowing to a pump chamber.

The pump chamber has a minimum nominal diameter of 380 mm and a minimum effective depth of 1200 mm. It is equipped with a minimum 0.5 HP effluent dosing pump, complete with level switches, alarm and control panel, discharging to a recirculating tank.

The recirculating tank has a minimum volume of 9.1 m^3, and includes a pump vault having a minimum of 380 mm dia. and a minimum of 1200 mm effective depth. It is equipped with a minimum 0.5 HP dosing pump complete with level switches, alarm and control panel, discharging effluent to a recirculating sand filter. It is also equipped with a recirculating splitter valve that discharges 20% of flow to a dosing tank and 80% of flow back to the recirculating tank. The tank is equipped with a physical filter to screen out solids larger than 3 mm.

The recirculating sand filter has an area of 22.75 m^2, is contained in a 30 mil PVC liner and it is designed to have a hydraulic loading rate no greater than 200 L/m^2/day. It includes a pressure distribution manifold, with laterals of a minimum 25 mm dia. pressure pipe, centered at 600 mm. The pipes have 3 mm dia. orifices, centered at 600 mm. The pipes are covered with a 150 mm layer of 9 mm washed pea stone and with cold weather shields. The layer of stone is underlaid by 600 mm of high load filter media. The filter media conforms to the following sieve sizing: #3/8: 100% passing; #4: 70-100% passing; #8: 5-78% passing; #16: 0-4% passing; #30: 0-2% passing; #50: 0-1% passing; #100: 0-1% passing; #200: 0-1% passing with D_{10} = 1.5 to 2.5 mm and C_u = 1 to 3. The sand filter media is underlaid by 150 mm of 19 mm clear stone containing a 100 mm dia., slotted drainage pipe discharging to a flow splitter valve in the recirculation tank.

The dosing tank has a minimum volume of 9.1 m^3, and includes a pump vault having a minimum of 380 mm dia. and a minimum of 1200 mm effective depth. It is equipped with a minimum 0.5 HP effluent pump, level switches, alarms and control panel, discharging the effluent at controlled intervals. The tank is equipped with a physical filter to screen out solids larger than 3 mm.

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Model RSF3216

This Orenco Treatment Unit is designed for **daily design sanitary sewage flow of up to 9700 L**. The system requires a standard septic tank with minimum volume of 29 100 L, complete with an effluent filter on the outlet to screen out particles larger than 3 mm, overflowing to a pump chamber.

The pump chamber has a minimum nominal diameter of 380 mm and a minimum effective depth of 1200 mm. It is equipped with a minimum 0.5 HP effluent dosing pump, complete with level switches, alarm and control panel, discharging to a recirculating tank.

The recirculating tank has a minimum volume of 9.7 m^3, and includes a pump vault having a minimum of 380 mm dia. and a minimum of 1200 mm effective depth. It is equipped with a minimum 0.5 HP dosing pump complete with level switches, alarm and control panel, discharging effluent to a recirculating sand filter. It is also equipped with a recirculating splitter valve that discharges 20% of flow to a dosing tank and 80% of flow back to the recirculating tank. The tank is equipped with a physical filter to screen out solids larger than 3 mm.

The recirculating sand filter has an area of 24.25 m^2, is contained in a 30 mil PVC liner and it is designed to have a hydraulic loading rate no greater than 200 L/m^2/day. It includes a pressure distribution manifold, with laterals of a minimum 25 mm dia. pressure pipe, centered at 600 mm. The pipes have 3 mm dia. orifices, centered at 600 mm. The pipes are covered with a 150 mm layer of 9 mm washed pea stone and with cold weather shields. The layer of stone is underlaid by 600 mm of high load filter media. The filter media conforms to the following sieve sizing: #3/8: 100% passing; #4: 70-100% passing; #8: 5-78% passing; #16: 0-4% passing; #30: 0-2% passing; #50: 0-1% passing; #100: 0-1% passing; #200: 0-1% passing with D_{10} = 1.5 to 2.5 mm and C_u = 1 to 3. The sand filter media is underlaid by 150 mm of 19 mm clear stone containing a 100 mm dia., slotted drainage pipe discharging to a flow splitter valve in the recirculation tank.

The dosing tank has a minimum volume of 9.7 m^3, and includes a pump vault having a minimum of 380 mm dia. and a minimum of 1200 mm effective depth. It is equipped with a minimum 0.5 HP effluent pump, level switches, alarms and control panel, discharging the effluent at controlled intervals. The tank is equipped with a physical filter to screen out solids larger than 3 mm.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of the Orenco Systems Inc. and/or its licensed agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Waterloo Biofilter Treatment Systems

Models 11 to 100

These Waterloo Biofilter Treatment Units are designed for **daily design sanitary sewage flow of up to 10 000 L**. Each treatment unit requires a standard septic tank with minimum volume determined from Table 3, complete with an effluent filter on the outlet to screen out particles larger than 5 mm, overflowing to a pump chamber.

The minimum nominal diameter and minimum effective depth (or minimum volume) of the pump chamber is determined from Table 3. The pump chamber is equipped with a minimum 0.3 HP effluent pump, complete with level switches, alarm and control panel, discharging to a Waterloo Biofilter Treatment Unit.

The Waterloo Biofilter Treatment Unit consists of an enclosure containing the Waterloo Biofilter polyurethane filter medium, a distribution system to evenly distribute the septic tank effluent on the top of the filter medium, and an optional ventilation fan. The minimum volume of the medium for each model are shown in Table 3. The treatment enclosure incorporates a distribution system designed such that the effluent is dosed at a rate that does not exceed 9 L per m^3 of the filter medium per dose.

The effluent from the treatment unit is pumped from the treatment enclosure or from a separate pump chamber by means of an effluent dosing pump with a minimum of 0.3 HP, or higher to satisfy the pressure head requirements of the shallow buried trench system, with level switches, alarm and control panel. The pump re-circulates approximately 50% of the effluent to the septic tank and discharges approximately 50% of the effluent to a shallow buried trench.

Models 11a to 100a

These treatment units are the same as "**Models 11 to 100**", except that the treatment enclosures are located above ground. These systems also include a second pump chamber, following the Waterloo Biofilter treatment unit, with a minimum effective volume of 100% of the daily design sanitary sewage flow. It is equipped with a minimum 0.3 HP effluent pump, complete with level switches, alarm and control panel. The pump re-circulates approximately 50% of the effluent to the septic tank and discharges approximately 50% of the effluent to a shallow buried trench.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of Waterloo Biofilter Treatment Systems and/or its licensed agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electric Safety Authority, etc.

Table 3

Models	Daily Design Flow, (L)	Minimum Septic Tank Capacity, (L)	Minimum Pump Chamber Dimensions diameter x depth, (mm) or Volume, (L)	Minimum Volume of Biofilter Medium, (m^3)
11	1100	3600	500 x 1200	1.5
16	1600	3600	600 x 1500	3.0
20	2000	4500	600 x 1500	3.0
25	2500	5000	600 x 1500	3.6
30	3000	6000	600 x 1500	4.2
35	3500	7000	Volume = 2700	5.1
40	4000	8000	Volume = 2700	6.1
45	4500	9000	Volume = 3600	7.1
50	5000	10 000	Volume = 3600	8.1
55	5500	11 000	Volume = 3600	8.9
60	6000	12 000	Volume = 4500	9.7
65	6500	13 000	Volume = 4500	10.5
70	7000	14 000	Volume = 5400	11.3
75	7500	15 000	Volume = 5400	12.1
80	8000	16 000	Volume = 6800	13.0
85	8500	17 000	Volume = 6800	13.8
90	9000	18 000	Volume = 6800	14.6
95	9500	19 000	Volume = 9100	15.4
100	10 000	20 000	Volume = 9100	16.2

Clearstream Treatment Systems

Model 500N

This Clearstream Treatment Unit is designed for **daily design sanitary sewage flow of 850 L to 1900 L**. It consists of a septic tank with a minimum volume of 2.7 m^3 complete with an effluent filter on the outlet of the tank to screen out solids larger than 5 mm, overflowing to a Clearstream Treatment Unit with a total volumetric capacity of 2.99 m^3, complete with an aeration tank equipped with two fine bubble diffusers and an air pump rated at 1.13 L/s together with an inner conical up welling clarifier equipped with surge control weir overflowing to a single pass free access sand filter.

Where the percolation rate of the native subsoil is between 50 min/cm and 125 min/cm, the treatment unit shall also include a single pass free access sand filter (model NPSCS-10), or a 100 micron spin filter model number 1100. The sand filter consists of a fibreglass tank complete with wood planks covers, 100 mm dia. distribution piping, 5.03 m^2 area at 600 mm depth, filtration sand media (1.0 mm dia. to 2.0 mm dia. with 1.5 uniformity coefficient), 150 mm pea gravel layer and 100 mm dia. slotted collection piping discharging the effluent by gravity to a dosing pump chamber. The dosing pump chamber shall have a volumetric capacity of 4.7 m^3 equipped with a minimum 0.3 HP submersible effluent pump complete with level switches, alarm and control panel together with a forcemain discharging the effluent.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of Northern Purification Systems (823077 Ontario Inc.) and/or its licensed agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Model 600N

This Clearstream Treatment Unit is designed for **daily design sanitary sewage flow of 1900 L to 2280 L**. It consists of a septic tank with a minimum volume of 2.7 m^3 complete with an effluent filter on the outlet of the tank to screen out solids larger than 5 mm, overflowing to a Clearstream Treatment Unit with a total volumetric capacity of 3.52 m^3, complete with an aeration tank equipped with two fine bubble diffusers and an air pump rated at 1.13 L/s together with an inner conical up welling clarifier equipped with surge control weir overflowing to a single pass free access sand filter.

Where the percolation rate of the native subsoil is between 50 min/cm and 125 min/cm, the treatment unit shall also include a single pass free access sand filter (model NPSCS-10), or a 100 micron spin filter model number 1100. The sand filter consists of a fibreglass tank complete with wood planks covers, 100 mm dia. distribution piping, 5.03 m^2 area at 600 mm depth, filtration sand media (1.0 mm dia. to 2.0 mm dia. with 1.5 uniformity coefficient), 150 mm pea gravel layer and 100 mm dia. slotted collection piping discharging the effluent by gravity to a dosing pump chamber. The dosing pump chamber shall have a volumetric capacity of 4.7 m^3 equipped with a minimum 0.3 HP submersible effluent pump complete with level switches, alarm and control panel together with a forcemain discharging the effluent.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of Northern Purification Systems (823077 Ontario Inc.) and/or its licensed agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Model 750N

This Clearstream Treatment Unit is designed for **daily design sanitary sewage flow of 2280 L to 2850 L**. It consists of a septic tank with a minimum volume of 2.7 m^3 complete with an effluent filter on the outlet of the tank to screen out solids larger than 5 mm, overflowing to a Clearstream Treatment Unit with a total volumetric capacity of 4.5 m^3, complete with an aeration tank equipped with two fine bubble diffusers and an air pump rated at 1.7 L/s together with an inner conical up welling clarifier equipped with surge control weir overflowing to a single pass free access sand filter.

Where the percolation rate of the native subsoil is between 50 min/cm and 125 min/cm, the treatment unit shall also include a single pass free access sand filter (model NPSCS-20), or a 100 micron spin filter model number 1100. The sand filter consists of a fibreglass tank complete with wood planks covers, 100 mm dia. distribution piping, 6.51 m^2 area at 600 mm depth, filtration sand media (1.0 mm dia. to 2.0 mm dia. with 1.5 uniformity coefficient), 150 mm pea gravel layer and 100 mm dia. slotted collection piping discharging the effluent by gravity to a dosing pump chamber. The dosing pump chamber shall have a volumetric capacity of 4.7 m^3 equipped with a minimum 0.3 HP submersible effluent pump complete with level switches, alarm and control panel together with a forcemain discharging the effluent.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of Northern Purification Systems (823077 Ontario Inc.) and/or its licensed agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Model 1000N

This Clearstream Treatment Unit is designed for **daily design sanitary sewage flow of 2850 L to 3800 L**. It consists of a septic tank with a minimum volume of 3.4 m^3 complete with an effluent filter on the outlet of the tank to screen out solids larger than 5 mm, overflowing to a Clearstream Treatment Unit with a total volumetric capacity of 6.5 m^3, complete with an aeration tank equipped with two fine bubble diffusers and an air pump rated at 2.26 L/s together with an inner conical up welling clarifier equipped with surge control weir overflowing to a single pass free access sand filter.

Where the percolation rate of the native subsoil is between 50 min/cm and 125 min/cm, the treatment unit shall also include two single pass free access sand filters (model NPSCS-10), or a 100 micron spin filter model number 1100. The sand filters consist of a fibreglass tank complete with wood planks covers, 100 mm dia. distribution piping, 6.51 m^2 area at 600 mm depth, filtration sand media (1.0 mm dia. to 2.0 mm dia. with 1.5 uniformity coefficient), 150 mm pea gravel layer and 100 mm dia. slotted collection piping discharging the effluent by gravity to a dosing pump chamber. The dosing pump chamber shall have a volumetric capacity of 6.8 m^3 equipped with a minimum 0.5 HP submersible effluent pump complete with level switches, alarm and control panel together with a forcemain discharging the effluent.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of Northern Purification Systems (823077 Ontario Inc.) and/or its licensed agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Model 1500N

This Clearstream Treatment Unit is designed for **daily design sanitary sewage flow of 3800 L to 5700 L**. It consists of a septic tank with a minimum volume of 4.5 m^3 complete with an effluent filter on the outlet of the tank to screen out solids larger than 5 mm, overflowing to a Clearstream Treatment Unit with a total volumetric capacity of 9.5 m^3, complete with an aeration tank equipped with two fine bubble diffusers and an air pump rated at 3.4 L/s together with an inner conical up welling clarifier equipped with surge control weir overflowing to a single pass free access sand filter.

Where the percolation rate of the native subsoil is between 50 min/cm and 125 min/cm, the treatment unit shall also include two single pass free access sand filters (model NPSCS-10), or a 100 micron spin filter model number 1100. The sand filters consist of a fibreglass tank complete with wood planks covers, 100 mm dia. distribution piping, 6.51 m^2 area at 600 mm depth, filtration sand media (1.0 mm dia. to 2.0 mm dia. with 1.5 uniformity coefficient), 150 mm pea gravel layer and 100 mm dia. slotted collection piping discharging the effluent by gravity to a dosing pump chamber. The dosing pump chamber shall have a volumetric capacity of 10.08 m^3 equipped with a minimum 0.5 HP submersible effluent pump complete with level switches, alarm and control panel together with a forcemain discharging the effluent.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of Northern Purification Systems (823077 Ontario Inc.) and/or its licensed agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Ecoflo® Biofilter Treatment Systems

Model Ecoflo® ST-500-PF Biofilter & Model Ecoflo® STB-500-PF Biofilter

This Ecoflo Biofilter Treatment Unit is designed for **daily design sanitary sewage flow of 850 L to 1500 L**. The system requires a standard septic tank complete with an effluent filter on the outlet to screen out particles larger than 1.6 mm, overflowing to a pump chamber.

The pump chamber has a minimum effective holding capacity of one time the daily design flow, equipped with a minimum 0.3 HP Ecopump, Model SP180 or equivalent effluent pump, complete with level switches, alarm and control panel. The pump chamber has a minimum 38 mm dia. discharge pipe, ball valve and a flow controller model RE-96 or equivalent, terminating in an Ecoflo® ST-500 Biofilter unit.

The Ecoflo® ST-650 Biofilter unit consists of a compact high-performance peat-based biofilter medium confined in a fiberglass shell. It is placed on a minimum of 200 mm thick layer of crushed stone (15 to 50 mm dia.) or gravel. A collecting device under the Biofilter directs the treated effluent through a 100 mm dia. pipe to a dosing chamber.

The dosing chamber has a minimum effective volume of half of the daily design flow and is equipped with a minimum 0.3 HP Ecopump, Model SP-180 or equivalent effluent pump, activated by a conventional on/off float or by a control panel. The dosing chamber is controlled by an alarm float installed in the chamber and is connected to an alarm panel placed inside the building on an independent electrical circuit. The effluent from the dosing tank is discharged to a shallow buried trench.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of Ecoflo Ontario and/or its licensed agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Model Ecoflo® ST-500-GF Biofilter & Model Ecoflo® STB-500-GF Biofilter

This Ecoflo Biofilter Treatment Unit is designed for **daily design sanitary sewage flow of 850 L to 1500 L**. The system requires a standard septic tank complete with an effluent filter on the outlet to screen out particles larger than 1.6 mm, overflowing to a pump chamber.

The Ecoflo® ST-500 Biofilter unit consists of a compact high-performance peat-based biofilter medium confined in a fiberglass shell. It is placed on a minimum of 200 mm thick layer of crushed stone (15 to 50 mm dia.) or gravel. A collecting device under the Biofilter directs the treated effluent through a 100 mm dia. pipe to a dosing chamber.

The dosing chamber has a minimum effective volume of half of the daily design flow and is equipped with a minimum 0.3 HP Ecopump, Model SP-180 or equivalent effluent pump, activated by a conventional on/off float or by a control panel. The dosing chamber is controlled by an alarm float installed in the chamber and is connected to an alarm panel placed inside the building on an independent electrical circuit. The effluent from the dosing tank is discharged to a shallow buried trench.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of Ecoflo Ontario and/or its licensed agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Model Ecoflo® ST-650-PF Biofilter & Model Ecoflo® STB-650-PF Biofilter

This Ecoflo Biofilter Treatment Unit is designed for **daily design sanitary sewage flow of 850 L to 2500 L**. The system requires a standard septic tank complete with an effluent filter on the outlet to screen out particles larger than 1.6 mm, overflowing to a pump chamber.

The pump chamber has a minimum effective holding capacity of one time the daily design flow, equipped with a minimum 0.3 HP Ecopump, Model SP180 or equivalent effluent pump, complete with level switches, alarm and control panel. The pump chamber has a minimum 38 mm dia. discharge pipe, ball valve and a flow controller model RE-96 or equivalent, terminating in an Ecoflo® ST-650 Biofilter unit.

The Ecoflo® ST-650 Biofilter unit consists of a compact high-performance peat-based biofilter medium confined in a fiberglass shell. It is placed on a minimum of 200 mm thick layer of crushed stone (15 to 50 mm dia.) or gravel. A collecting device under the Biofilter directs the treated effluent through a 100 mm dia. pipe to a dosing chamber.

The dosing chamber has a minimum effective volume of half of the daily design flow and is equipped with a minimum 0.3 HP Ecopump, Model SP-180 or equivalent effluent pump, activated by a conventional on/off float or by a control panel. The dosing chamber is controlled by an alarm float installed in the chamber and is connected to an alarm panel placed inside the building on an independent electrical circuit. The effluent from the dosing tank is discharged to a shallow buried trench.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of Ecoflo Ontario and/or its licensed agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Model Ecoflo® ST-650-GF Biofilter & Model Ecoflo® STB-650-GF Biofilter

This Ecoflo Biofilter Treatment Unit is designed for **daily design sanitary sewage flow of 850 L to 2500 L**. The system requires a standard septic tank complete with an effluent filter on the outlet to screen out particles larger than 1.6 mm, overflowing to an Ecoflo® ST-650 Biofilter unit.

The Ecoflo® ST-650 Biofilter unit consists of a compact high-performance peat-based biofilter medium confined in a fiberglass shell. It is placed on a minimum of 200 mm thick layer of crushed stone (15 to 50 mm dia.) or gravel. A collecting device under the Biofilter directs the treated effluent through a 100 mm dia. pipe to a dosing chamber.

The dosing chamber has a minimum effective volume of half of the daily design flow and is equipped with a minimum 0.3 HP Ecopump, Model SP-180 or equivalent effluent pump, activated by a conventional on/off float or by a control panel. The dosing chamber is controlled by an alarm float installed in the chamber and is connected to an alarm panel placed inside the building on an independent electrical circuit. The effluent from the dosing tank is discharged to a shallow buried trench.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of Ecoflo Ontario and/or its licensed agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Supplementary Standard SB-5

Model Ecoflo® ST-500 MCRI-PF Biofilter & Model Ecoflo® STB-500 MCRI-PF Biofilter

This Ecoflo Biofilter Treatment Unit is designed for **daily design sanitary sewage flow of 1500 L to 10 000 L**. The system requires a standard septic tank complete with an effluent filter on the outlet to screen out particles larger than 0.8 mm, overflowing to a pump chamber.

The pump chamber has a minimum effective holding capacity of one time the daily design flow, equipped with a minimum 0.5 HP Ecopump, Model SP 280 or equivalent effluent pump, complete with level switches, alarm and control panel. The pump chamber has a minimum 38 mm dia. discharge pipe connected to a Flow Splitter, Model RL-296, discharging through 100 mm dia. distribution pipes to a cluster of Ecoflo® ST-650 Biofilter units.

The Ecoflo® ST-650 Biofilter units in the cluster consist of a compact high-performance peat-based biofilter medium confined in a fiberglass shell. The units are placed on a minimum of 200 mm thick layer of crushed stone (15 to 50 mm dia.) or gravel. A collecting device under the Biofilters directs the treated effluent through a 100 mm dia. pipe to a dosing chamber.

The dosing chamber has a minimum effective volume of half of the daily design flow and is equipped with a minimum 0.5 HP Ecopump, Model SP-280 or equivalent effluent pump, activated by a conventional on/off float or by a control panel. The dosing chamber is controlled by an alarm float installed in the chamber and is connected to an alarm panel placed inside the building on an independent electrical circuit. The effluent from the dosing tank is discharged to a shallow buried trench.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of Ecoflo Ontario and/or its licensed agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Model Ecoflo® ST-650 MCRI-PF Biofilter & Model Ecoflo® STB-650 MCRI-PF Biofilter

This Ecoflo Biofilter Treatment Unit is designed for **daily design sanitary sewage flow of 2000 L to 10 000 L**. The system requires a standard septic tank complete with an effluent filter on the outlet to screen out particles larger than 0.8 mm, overflowing to a pump chamber.

The pump chamber has a minimum effective holding capacity of one time the daily design flow, equipped with a minimum 0.5 HP Ecopump, Model SP 280 or equivalent effluent pump, complete with level switches, alarm and control panel. The pump chamber has a minimum 38 mm dia. discharge pipe connected to a Flow Splitter, Model RL-296, discharging through 100 mm dia. distribution pipes to a cluster of Ecoflo® ST-650 Biofilter units.

The Ecoflo® ST-650 Biofilter units in the cluster consist of a compact high-performance peat-based biofilter medium confined in a fiberglass shell. The units are placed on a minimum of 200 mm thick layer of crushed stone (15 to 50 mm dia.) or gravel. A collecting device under the Biofilters directs the treated effluent through a 100 mm dia. pipe to a dosing chamber.

The dosing chamber has a minimum effective volume of half of the daily design flow and is equipped with a minimum 0.5 HP Ecopump, Model SP-280 or equivalent effluent pump, activated by a conventional on/off float or by a control panel. The dosing chamber is controlled by an alarm float installed in the chamber and is connected to an alarm panel placed inside the building on an independent electrical circuit. The effluent from the dosing tank is discharged to a shallow buried trench.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of Ecoflo Ontario and/or its licensed agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Whitewater Treatment Systems

Model DF 50 FF

This Whitewater Treatment Unit is designed for **daily design sanitary sewage flow of 850 L to 1900 L**. It consists of a treatment unit with a total volumetric capacity of 3.46 m^3, including a 2.4 m^3 volume aeration tank equipped with an air diffusion system and an air pump rated at 0.86 L/s. It also includes a 1.04 m^3 volume inner conical up welling clarifier overflowing to a dosing pump chamber or a sand filter.

Where the percolation rate of the native subsoil is between 50 min/cm and 125 min/cm, the treatment unit shall include a single pass free access sand filter or a 100 micron vortex spin filter model AP4E-100. The sand filter consists of a tank with two access openings and 100 mm distribution piping. The filter media has an area of 4.75 m^2 at 600 mm depth (1.8 mm to 2.44 mm dia. effective size with 1.5 uniformity coefficient), underlaid by 150 mm of pea gravel. The filter also includes 100 mm dia. perforated collection piping that discharges the effluent, by gravity, to a dosing pump chamber.

The dosing pump chamber has volumetric capacity of 3.3 m^3 and is equipped with a minimum 0.3 HP submersible effluent pump, complete with level switches, alarm and control panel and a forcemain discharging the effluent.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of Canwest Tanks & Ecological Systems Ltd. and/or its licensed agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Model DF 60 FF

This Whitewater Treatment Unit is designed for **daily design sanitary sewage flow of 1900 L to 2300 L**. It consists of a treatment unit with a total volumetric capacity of 4.33 m^3, including a 3.2 m^3 volume aeration tank equipped with an air diffusion system and an air pump rated at 1.03 L/s. It also includes a 1.13 m^3 volume inner conical up welling clarifier overflowing to a dosing pump chamber or a sand filter.

Where the percolation rate of the native subsoil is between 50 min/cm and 125 min/cm, the treatment unit shall include a single pass free access sand filter or a 100 micron vortex spin filter model AP4E. The sand filter consists of a tank with two access openings and 100 mm distribution piping. The filter media has an area of 5.75 m^2 at 600 mm depth (1.8 mm to 2.4 mm dia. effective size with 1.5 uniformity coefficient), underlaid by 150 mm of pea gravel. The filter also includes 100 mm dia. perforated collection piping that discharges the effluent, by gravity, to a dosing pump chamber.

The dosing pump chamber has volumetric capacity of 4.03 m^3 and is equipped with a minimum 0.3 HP submersible effluent pump, complete with level switches, alarm and control panel and a forcemain discharging the effluent.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of Canwest Tanks & Ecological Systems Ltd. and/or its licensed agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Model DF 75 FF

This Whitewater Treatment Unit is designed for **daily design sanitary sewage flow of 2300 L to 2900 L**. It consists of a treatment unit with a total volumetric capacity of 5.43 m^3, including a 3.8 m^3 volume aeration tank equipped with an air diffusion system and an air pump rated at 1.29 L/s. It also includes a 1.6 m^3 volume inner conical up welling clarifier overflowing to a dosing pump chamber or a sand filter.

Where the percolation rate of the native subsoil is between 50 min/cm and 125 min/cm, the treatment unit shall include a single pass free access sand filter or a 100 micron vortex spin filter model AP4E. The sand filter consists of a tank with two access openings and 100 mm distribution piping. The filter media has an area of 7.25 m^2 at 600 mm depth (1.8 mm to 2.4 mm dia. effective size with 1.5 uniformity coefficient), underlaid by 150 mm of pea gravel. The filter also includes 100 mm dia. perforated collection piping that discharges the effluent, by gravity, to a dosing pump chamber.

The dosing pump chamber has volumetric capacity of 5.1 m^3 and is equipped with a minimum 0.4 HP submersible effluent pump, complete with level switches, alarm and control panel and a forcemain discharging the effluent.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of Canwest Tanks & Ecological Systems Ltd. and/or its licensed agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Model DF 100 FF

This Whitewater Treatment Unit is designed for **daily design sanitary sewage flow of 2900 L to 3800 L**. It consists of a treatment unit with a total volumetric capacity of 7.28 m^3, including a 5.4 m^3 volume aeration tank equipped with an air diffusion system and an air pump rated at 1.72 L/s. It also includes a 1.85 m^3 volume inner conical up welling clarifier overflowing to a dosing pump chamber or a sand filter.

Where the percolation rate of the native subsoil is between 50 min/cm and 125 min/cm, the treatment unit shall include a single pass free access sand filter or a 100 micron vortex spin filter model AP4E. The sand filter consists of a tank with two access openings and 100 mm distribution piping. The filter media has an area of 9.54 m^2 at 600 mm depth (1.8 mm to 2.4 mm dia. effective size with 1.5 uniformity coefficient), underlaid by 150 mm of pea gravel. The filter also includes 100 mm dia. perforated collection piping that discharges the effluent, by gravity, to a dosing pump chamber.

The dosing pump chamber has volumetric capacity of 6.7 m^3 and is equipped with a minimum 0.4 HP submersible effluent pump, complete with level switches, alarm and control panel and a forcemain discharging the effluent.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of Canwest Tanks & Ecological Systems Ltd. and/or its licensed agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Model DF 150 FF

This Whitewater Treatment Unit is designed for **daily design sanitary sewage flow of 3800 L to 5700 L**. It consists of a treatment unit with a total volumetric capacity of 10.89 m^3, including a 8.0 m^3 volume aeration tank equipped with an air diffusion system and an air pump rated at 2.58 L/s. It also includes a 2.86 m^3 volume inner conical up welling clarifier overflowing to a dosing pump chamber or a sand filter.

Where the percolation rate of the native subsoil is between 50 min/cm and 125 min/cm, the treatment unit shall include a single pass free access sand filter or a 100 micron vortex spin filter model AP4E. The sand filter consists of a tank with two access openings and 100 mm distribution piping. The filter media has an area of 14.25 m^2 at 600 mm depth (1.8 mm to 2.4 mm dia. effective size with 1.5 uniformity coefficient), underlaid by 150 mm of pea gravel. The filter also includes 100 mm dia. perforated collection piping that discharges the effluent, by gravity, to a dosing pump chamber.

The dosing pump chamber has volumetric capacity of 6.7 m^3 and is equipped with a minimum 0.4 HP submersible effluent pump, complete with level switches, alarm and control panel and a forcemain discharging the effluent.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of Canwest Tanks & Ecological Systems Ltd. and/or its licensed agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Model DF 150X2 FF

This Whitewater Treatment Unit is designed for **daily design sanitary sewage flow of 5700 L to 10 000 L**. It consists of a 5.5 m^3 volume trash collector tank with inlet and outlet baffles discharging, through a self adjusting flow equalizing distribution box, to two "Model DF 150 FF" Whitewater treatment units. The effluent from treatment unit overflows to a dosing pump chamber or a sand filter.

Where the percolation rate of the native subsoil is between 50 min/cm and 125 min/cm, the treatment unit shall include a single pass free access sand filter or a 100 micron vortex spin filter model AP4E. The sand filter consists of a tank with two access openings and 100 mm distribution piping. The filter media has an area of 25 m^2 at 600 mm depth (1.8 mm to 2.4 mm dia. effective size with 1.5 uniformity coefficient), underlaid by 150 mm of pea gravel. The filter also includes 100 mm dia. perforated collection piping that discharges the effluent, by gravity, to a dosing pump chamber.

The dosing pump chamber has volumetric capacity of 17.5 m^3 and is equipped with a minimum 0.5 HP submersible effluent pump, complete with level switches, alarm and control panel and a forcemain discharging the effluent.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of Canwest Tanks & Ecological Systems Ltd. and/or its licensed agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Biocycle Aerated Wastewater System

Model 5800-10

This Biocycle Treatment Unit is designed for **daily design sanitary sewage flow of 850 L to 2000L**. It consists of a treatment unit with a total volumetric capacity of 8.21 m^3 and operating volume of 5.4 m^3, complete with a 2.4 m^3 baffled primary anaerobic chamber; a 2.57 m^3 aeration tank equipped with fixed growth media; an air diffusion system; an air pump rated at 1.33 L/s; and a 0.44 m^3 inner conical clarifier equipped with sludge return piping.

Where the percolation rate of the native subsoil is between 50 min/cm and 125 min/cm, the treatment unit shall also include a 0.65 m^3 inner pump chamber equipped with a 250 mm dia. pressure sand filter containing 600 mm depth sand media (0.45 mm to 0.55 mm dia. effective size with 1.6 uniformity coefficient); a pump rated at 0.38 L/s with associated piping and valves, level switches, alarm and control panel, discharging effluent through the pressure sand filter to a dosing chamber.

The dosing pump chamber has volumetric capacity of 3.0 m^3 and is equipped with a filter backwash pump, rated at 0.38 L/s, and associated piping and valves; a minimum 0.3 HP submersible field dosing pump complete with level switches, alarm and control panel and a forcemain discharging the effluent.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of Canadian Biocycle Ltd and/or its licensed agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Rotordisk Wastewater System

Model S-12

The Model S-12 ROTORDISK as manufactured by CMS Group Inc. or its licensed manufacturers is designed for **daily design sanitary sewage flow of up to 2000 L** of domestic wastewater. The treatment unit is self contained in a 2.425 m^3 fiberglass or concrete tank that is divided into three compartments. The primary settling chamber has a capacity of 1.395 m^3, the final settling chamber has a capacity of 0.62 m^3 and the biological contactor zone that house the ROTORDISK has a capacity of 0.41 m^3. The biological contactor zone is located between the primary and final chambers. The ROTORDISK contains at least three packs of high density polyethylene disks that have a total surface area of 67 m^2. The disks are partially submerged in the wastewater and are rotated by a small 1/4 HP electric motor. The effluent from the final chamber flows to a single pass free access sand filter or to a dosing pump chamber.

Where the percolation rate of the native subsoil is between 50 min/cm and 125 min/cm, the treatment unit shall include a single pass free access sand filter consisting of a tank equipped with openings accessible from grade, sand filter and 100 mm dia. distribution piping. The sand filter has an area of 4.5 m^2 and a depth of 450 mm (sand media with 1 mm to 1.5 mm dia effective size with 1.5 uniformity coefficient); 150 mm bottom layer of pea gravel and 100 mm underdrain pipes discharging the effluent by gravity to an effluent dosing chamber.

The dosing pump chamber consists of a precast concrete effluent chamber with 3.5 m^3 volumetric capacity, a minimum 1/3 HP effluent pump, level switches, alarms and control panel and a forcemain discharging the effluent.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of CMS Group Inc. and/or its licensed agents to ensure that units meet all other applicable standards. Other Standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electric Safety Authority, and others.

FAST® Wastewater Treatment Systems

Model: MicroFAST® 0.5

This FAST® wastewater treatment system is designed for a **daily design sanitary sewage flow up to 1900 L**. The FAST® treatment system consists of a two-chamber concrete or fiberglass tank or two separate concrete or fiberglass tanks with the first chamber/tank being a settling chamber having a working volume not less than 1300 L and not more than 1900 L. The second chamber/tank will have a working volume not less than 1700 L. A single, two-chamber tank has the first chamber consisting of a service access hatch, baffled inlet and a 150 mm diameter crossover connection to the second chamber. A two-tank arrangement has the first tank with a service access hatch and a 100 mm diameter baffled sanitary tee connection. The second chamber/tank consists of a service access, vent and inspection ports and the FAST® insert module as supplied by Bio-Microbics, Inc.

The second chamber/tank contains the FAST® insert module by either the lid suspension or the leg support method with at least 250 mm clearance from the tank bottom to the FAST® insert module. The FAST® insert module consists of an airlift arrangement and is equipped with a plastic surge control bio-filter media sized and designed for this model with an outlet clarifier baffle. The airlift is operated with a 1/3 HP, 110/115 Volt Single Phase external blower. The effluent from the second chamber is discharged to a single pass free access sand filter or to a dosing chamber.

Where the percolation time of the native soil is between 50 min/cm and 125 min/cm, the treatment unit shall include a single pass free access sand filter or GAG Sim/Tech 100 micron, pressure filter model number STF-100 and STF-100AZ, or a 100 micron vortex filter. The sand filter consists of a tank equipped with openings accessible from grade, 100 mm distribution piping, sand filter with an area of 3.4 m^2 and a depth of 450 mm (sand media with 0.4 mm to 1.5 mm dia. effective size with a uniformity coefficient of 3); 150 mm pea gravel layer and 100 mm dia. slotted collection piping discharging the effluent by gravity to an effluent dosing chamber.

The dosing chamber consists of a precast concrete effluent pump chamber with 3.4 m^3 volumetric capacity, a minimum of 0.3 HP submersible pump, level switches, alarms and control panel and a forcemain discharging the effluent.

This approval is only for the treatment unit component of the sewage system and. **The sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of Bio-Microbics Inc. and/or its licensed agents to ensure that units meet all other applicable standards. Other Standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, and others.

Model: MicroFAST® 0.75

This FAST® wastewater treatment system is designed for a **daily design sanitary sewage flow up to 2850 L**. The FAST® treatment system consists of a two-chamber concrete, or fiberglass tank or two separate concrete or fiberglass tanks and having a working volume of not less than 1900 L and not more than 2850 L. The second chamber/tank will have a working volume not less than 2850 L. A single, two-chamber tank has the first chamber consisting of a service access hatch, baffled inlet and a 150 mm diameter crossover connection to the second chamber. A two-tank arrangement has the first tank with a service access hatch and a 100 mm diameter baffled sanitary tee connection. The second chamber/tank consists of a service access, vent and inspection ports and the FAST® insert module as supplied by Bio-Microbics, Inc.

The second chamber/tank contains the FAST® insert module by either the lid suspension or the leg support method with at least 250 mm clearance from the tank bottom to the FAST® insert module. The FAST® insert module consists of an airlift arrangement and is quipped with a plastic surge control bio-filter media sized and designed for this model, with an outlet clarifier baffle. The airlift is operated with a 1/3 HP, 110/115 Volt Single Phase external blower. The effluent from the second chamber is discharged to a single pass free access sand filter or to a dosing chamber.

Where the percolation time of the native soil is between 50 min/cm and 125 min/cm, the treatment unit shall include a single pass free access sand filter or GAG Sim/Tech 100 micron, pressure filter model number STF-100 and STF-100AZ, or a 100 micron vortex filter. The sand filter consists of a tank equipped with openings accessible from grade, 100 mm distribution piping, sand filter with an area of 5.1 m^2 and a depth of 450 mm (sand media with 0.4 mm to 1.5 mm dia. effective size with a uniformity coefficient of 3); 150 mm pea gravel layer and 100 mm dia. slotted collection piping discharging the effluent by gravity to an effluent dosing chamber.

The dosing chamber consists of a precast concrete effluent pump chamber with 5 m^3 volumetric capacity, a minimum of 0.3 HP submersible pump, level switches, alarms and control panel and a forcemain discharging the effluent.

This approval is only for the treatment unit component of the sewage system and. **The sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of Bio-Microbics Inc. and/or its licensed agents to ensure that units meet all other applicable standards. Other Standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, and others.

Model: MicroFAST® 0.9

This FAST® wastewater treatment system is designed for a **daily design sanitary sewage flow up to 3400 L**. The FAST® treatment system consists of a two-chamber concrete or fiberglass tank or two separate concrete or fiberglass tanks with the first chamber/tank being a settling chamber and having a working volume not less than 1900 L and not more than 3400 L. The second chamber/tank will have a working volume not less than 2850 L. A single, two-chamber tank has the first chamber consisting of a service access hatch, baffled inlet and a 150 mm diameter crossover connection to the second chamber. A two-tank arrangement has the first tank with a service access hatch and a 100 mm diameter baffled sanitary tee connection. The second tank consists of a service access, vent and inspection ports and the FAST® insert module as supplied by Bio-Microbics Inc.

The second chamber/tank contains the FAST® insert module by either the lid suspension or the leg support method with at least 250 mm clearance from the tank bottom to the FAST® insert module. The FAST® insert module consists of an airlift arrangement and is equipped with a plastic surge control bio-filter media designed for residential strength wastewater and designed with an outlet clarifier baffle. The airlift is operated with a 1/3 HP, 110/115 Volt Single Phase external blower. The effluent from the second chamber is discharged to a single pass free access sand filter or to a dosing chamber.

Where the percolation time of the native soil is between 50 min/cm and 125 min/cm, the treatment unit shall include a single pass free access sand filter or GAG Sim/Tech 100 micron, pressure filter model number STF-100 and STF-100AZ, or a 100 micron vortex filter. The sand filter consists of a tank equipped with openings accessible from grade, 100 mm distribution piping, sand filter with an area of 6.8 m^2 and a depth of 450 mm (sand media with 0.4 mm to 1.5 mm dia. effective size with a uniformity coefficient of 3); 150 mm pea gravel layer and 100 mm dia. slotted collection piping discharging the effluent by gravity to an effluent dosing chamber.

The dosing chamber consists of a precast concrete effluent pump chamber with 6 m^3 volumetric capacity, a minimum of 0.3 HP submersible pump, level switches, alarms and control panel and a forcemain discharging the effluent.

This approval is only for the treatment unit component of the sewage system. **The sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of Bio-Microbics Inc. and/or its licensed agents to ensure that units meet all other applicable standards. Other Standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, and others.

Model: MicroFAST® 1.5

This FAST® wastewater treatment system is designed for a **daily design sanitary sewage flow up to 5700 L**. The FAST® treatment system consists of a two-chamber tank or two separate tanks with the first chamber/tank being a settling chamber and having a working volume not less than 2850 L but not more than 5700 L. The second chamber/tank will have a working volume not less than 4300 L. A single, two-chamber tank has the first chamber consisting of a service access hatch, baffled inlet and a 150 mm diameter crossover connection to the second chamber. A two-tank arrangement has the first tank with a service access hatch and a 100 mm diameter baffled sanitary tee connection. The second tank consists of a service access, vent and inspection ports and the FAST® insert module as supplied by Bio-Microbics, Inc.

The second chamber/tank contains the FAST® insert module by either the lid suspension or the leg support method with at least 250 mm clearance from the tank bottom to the FAST® insert module. The FAST® insert module consists of an airlift arrangement and is equipped with a plastic surge control bio-filter media sized and designed for this model with an outlet clarifier baffle. The airlift is operated with a ½ to ¾ HP, 110/115 Volt Single Phase external blower. The effluent from the second chamber is discharged to a single pass free access sand filter or to a dosing chamber.

Where the percolation time of the native soil is between 50 min/cm and 125 min/cm, the treatment unit shall include a single pass free access sand filter or GAG Sim/Tech 100 micron, pressure filter model number STF-100 and STF-100AZ, or a 100 micron vortex filter. The sand filter consists of a tank equipped with openings accessible from grade, 100 mm distribution piping, sand filter with an area of 6.8 m^2 and a depth of 450 mm (sand media with 0.4 mm to 1.5 mm dia. effective size with a uniformity coefficient of 3); 150 mm pea gravel layer and 100 mm dia. slotted collection piping discharging the effluent by gravity to an effluent dosing chamber.

The dosing chamber consists of a precast concrete effluent pump chamber with 6.7 m^3 volumetric capacity, a minimum of 0.3 HP submersible pump, level switches, alarms and control panel and a forcemain discharging the effluent.

This approval is only for the treatment unit component of the sewage. **The sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of Bio-Microbics Inc. and/or its licensed agents to ensure that units meet all other applicable standards. Other Standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, and others.

Aquarobic Treatment Systems

Model MicroMini-28

This Aquarobic Treatment Unit is designed for a **daily design sanitary sewage flow of 750 L to 2800 L**. It consists of a treatment unit in a concrete, fiberglass, or plastic single chamber tank, sized at 3 times the daily required volume. The treatment unit discharges the effluent to a dosing pump chamber or a sand filter.

The treatment unit consists of a .33 **HP** air blower, 6 Aquarobic air diffusers; a 0.5 **HP** side intake stainless steel effluent pump; a 50 micron spin filter; 3 level sensors. All components are accessible through a vented fiberglass manway and controlled by an Aquarobic factory built control panel.

The dosing chamber is either precast concrete, fiberglass, or plastic sized at 1.5 times the daily required volume. The chamber is equipped with submersible effluent pump (minimum 0.3 HP), level sensor float, high level sensor alarm, control panel and a forcemain discharging the effluent.

Where the percolation rate of the native subsoil is between 50 min/cm and 125 min/cm, the treatment unit shall include a single pass free access sand filter consisting of a tank with two access openings, 100 mm distribution piping, sand filter with an area of 5 m^2 and a depth of 450 mm (sand media with 0.4 mm to 1.5 mm dia. effective size with 3 uniformity coefficient); 150 mm of pea gravel layer and 100 mm dia. perforated collection piping discharging the effluent by gravity to the dosing pump chamber.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of Aquarobic Canada and/or its agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Model MicroMini-45

This Aquarobic Treatment Unit is designed for **daily design sanitary sewage flow of 2800 L to 4500 L**. It consists of a treatment unit in a concrete, fiberglass, or plastic single chamber tank, sized at 3 times the daily required volume. The treatment unit discharges the effluent to a dosing pump chamber or a sand filter.

This treatment unit consists of a .5 **HP** air blower, 8 Aquarobic air diffusers; a 0.75 **HP** side intake stainless steel effluent pump; a 50 micron spin filter; 3 level sensors. All components are accessible through a vented fiberglass manway and controlled by an Aquarobic factory built control panel.

The dosing chamber is either precast concrete, fiberglass, or plastic sized at 1.5 times the daily required volume. The chamber is equipped with submersible effluent pump (minimum 0.3 HP), level sensor float, high level sensor alarm, control panel and a forcemain discharging the effluent.

Where the percolation rate of the native subsoil is between 50 min/cm and 125 min/cm, the treatment unit shall include a single pass free access sand filter consisting of a tank with two access openings, 100 mm distribution piping, sand filter with an area of 11 m^2 and a depth of 450 mm (sand media with 0.4 mm to 1.5 mm dia. effective size with 3 uniformity coefficient); 150 mm of pea gravel layer and 100 mm dia. perforated collection piping discharging the effluent by gravity to the dosing pump chamber.

This approval is only for the treatment unit component of **the sewage system and the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of Aquarobic Canada and/or its agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Model MiniPlant-70

This Aquarobic Treatment Unit is designed for a **daily design sanitary sewage flow of 4500 L to 7000 L**. It consists of a treatment unit in a concrete, fiberglass, or plastic single chamber tank, sized at 3 times the daily required volume. The treatment unit discharges the effluent to a dosing pump chamber or a sand filter.

This treatment unit consists of a 1 **HP** air blower, 10 Aquarobic air diffusers; a 1 **HP** side intake stainless steel effluent pump; a 50 micron spin filter; 3 level sensors. All components are accessible through a vented fiberglass manway and controlled by an Aquarobic factory built control panel.

The dosing chamber is either precast concrete, fiberglass, or plastic sized at 1.5 times the daily required volume. The chamber is equipped with submersible effluent pump (minimum 0.3 **HP**), level sensor float, high level sensor alarm, control panel and a forcemain discharging the effluent.

Where the percolation rate of the native subsoil is between 50 min/cm and 125 min/cm, the treatment unit shall include a single pass free access sand filter consisting of a tank with two access openings, 100 mm distribution piping, sand filter with an area of 18 m^2 and a depth of 450 mm (sand media with 0.4 mm to 1.5 mm dia. effective size with 3 uniformity coefficient); 150 mm of pea gravel layer and 100 mm dia. perforated collection piping discharging the effluent by gravity to the dosing pump chamber.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of Aquarobic Canada and/or its agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Model MiniPlant-85

This Aquarobic Treatment Unit is designed for **daily design sanitary sewage flow of 7000 L to 8500 L**. It consists of a treatment unit in a concrete, fiberglass, or plastic single chamber tank, sized at 3 times the daily required volume. The treatment unit discharges the effluent to a dosing pump chamber or a sand filter.

This treatment unit consists of a 1.5 **HP** air blower, 12 Aquarobic air diffusers; a 1 **HP** side intake stainless steel effluent pump; a 50 micron spin filter; 3 level sensors. All components are accessible through a vented fiberglass manway and controlled by an Aquarobic factory built control panel.

The dosing chamber is either precast concrete, fiberglass, or plastic sized at 1.5 times the daily required volume. The chamber is equipped with submersible effluent pump (minimum 0.3 **HP**), level sensor float, high level sensor alarm, control panel and a forcemain discharging the effluent.

Where the percolation rate of the native subsoil is between 50 min/cm and 125 min/cm, the treatment unit shall include a single pass free access sand filter consisting of a tank with two access openings, 100 mm distribution piping, sand filter with an area of 21 m^2 and a depth of 450 mm (sand media with 0.4 mm to 1.5 mm dia. effective size with 3 uniformity coefficient); 150 mm of pea gravel layer and 100 mm dia. perforated collection piping discharging the effluent by gravity to the dosing pump chamber.

This approval is only for the treatment unit component of **the sewage system and the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of Aquarobic Canada and/or its agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Nayadic Wastewater Treatment Systems

Model M6A

This Nayadic Wastewater Treatment Unit is designed for a **daily design sanitary sewage flow of up to 1900 L**. It consists of a 3600 L pre-treatment septic tank, Nayadic M6A treatment unit with a total volumetric capacity of 2.27 m^3, including an integral aeration tank equipped with a diaphragm air diffuser and a ¼ HP air pump. It also includes an inner conical up welling clarifier overflowing 360-degree weir to a dosing pump chamber.

Where the percolation rate of the native subsoil is between 50 min/cm and 125 min/cm, the treatment unit shall include a 1.5 in SpinClean filter with max.100 micron mesh screen, or a single pass free access sand filter consisting of a tank with openings accessible from grade, 100 mm distribution piping, sand filter with an area of 4.65 m^2 at 600 mm depth (sand media with 0.4 mm to 1.5 mm dia. effective size with uniformity coefficient of 3), underlaid by 150 mm pea gravel and 100 mm dia. slotted collection piping discharging the effluent by gravity to a dosing chamber.

The dosing pump chamber has a volumetric capacity of min 3.3 m^3 and is equipped with a minimum 0.4 HP submersible effluent pump complete with pressure activated level switches, alarm and control panel, and a forcemain discharging the effluent at controlled intervals.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of the Consolidated Treatment System Inc., and/or its licensed agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electric Safety Authority, etc.

Model M8A

This Nayadic Wastewater Treatment Unit is designed for a **daily design sanitary sewage flow of up to 2300 L**. It consists of a 3600 L pre-treatment septic tank, Nayadic M8A treatment unit with a total volumetric capacity of 3.03 m^3, including an integral aeration tank equipped with a diaphragm air diffuser and a ¼ HP air pump. It also includes an inner conical up welling clarifier overflowing 360-degree weir to a dosing pump chamber.

Where the percolation rate of the native subsoil is between 50 min/cm and 125 min/cm, the treatment unit shall include a 1.5 in SpinClean filter with max.100 micron mesh screen, or a single pass free access sand filter consisting of a tank with openings accessible from grade, 100 mm distribution piping, sand filter with an area of 5.57 m^2 at 600 mm depth (sand media with 0.4 mm to 1.5 mm dia. effective size with uniformity coefficient of 3), underlaid by 150 mm pea gravel and 100 mm dia. slotted collection piping discharging the effluent by gravity to a dosing chamber.

The dosing pump chamber has a volumetric capacity of 4 m^3 and is equipped with a minimum 0.4 HP submersible effluent pump complete with pressure activated level switches, alarm and control panel, a 1.5 in SpinClean filter with max. 100 micron mesh screen and a forcemain discharging the effluent at controlled intervals.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of the Consolidated Treatment System Inc., and/or its licensed agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electric Safety Authority, etc.

Model M1050A

This Nayadic Wastewater Treatment Unit is designed for a **daily design sanitary sewage flow of up to 3000 L**. It consists of a 4500 L pre-treatment septic tank, Nayadic M1050A treatment unit with a total volumetric capacity of 4.54 m^3, including an integral aeration tank equipped with a diaphragm air diffuser and a ⅓ HP air pump. It also includes an inner conical up welling clarifier overflowing 360-degree weir to a dosing pump chamber.

Where the percolation rate of the native subsoil is between 50 min/cm and 125 min/cm, the treatment unit shall include a 1.5 in SpinClean filter with max.100 micron mesh screen, or a single pass free access sand filter consisting of a tank with openings accessible from grade, 100 mm distribution piping, sand filter with an area of 6.95 m^2 at 600 mm depth (sand media with 0.4 mm to 1.5 mm dia. effective size with uniformity coefficient of 3), underlaid by 150 mm pea gravel and 100 mm dia. slotted collection piping discharging the effluent by gravity to a dosing chamber.

The dosing pump chamber has a volumetric capacity of 5.3 m^3 and is equipped with a minimum 0.4 HP submersible effluent pump complete with pressure activated level switches, alarm and control panel, a 1.5 in SpinClean filter with max. 100 micron mesh screen and a forcemain discharging the effluent at controlled intervals.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of the Consolidated Treatment System Inc., and/or its licensed agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electric Safety Authority, etc.

Model M1200A

This Nayadic Wastewater Treatment Unit is designed for a **daily design sanitary sewage flow of up to 3800 L**. It consists of a 4500 L pre-treatment septic tank, Nayadic M1200A treatment unit with a total volumetric capacity of 3.97 m^3, including an integral aeration tank equipped with a diaphragm air diffuser and a ⅓ HP air pump. It also includes an inner conical up welling clarifier overflowing 360-degree weir to a dosing pump chamber.

Where the percolation rate of the native subsoil is between 50 min/cm and 125 min/cm, the treatment unit shall include a 1.5 in SpinClean filter with max.100 micron mesh screen, or a single pass free access sand filter consisting of a tank with openings accessible from grade, 100 mm distribution piping, sand filter with an area of 9.29 m^2 at 600 mm depth (sand media with 0.4 mm to 1.5 mm dia effective size with uniformity coefficient of 3), underlaid by 150 mm pea gravel and 100 mm dia. slotted collection piping discharging the effluent by gravity to a dosing chamber.

The dosing pump chamber has a volumetric capacity of 6.65 m^3 and is equipped with a minimum 0.4 HP submersible effluent pump complete with pressure activated level switches, alarm and control panel, a 1.5 in SpinClean filter with max. 100 micron mesh screen and a forcemain discharging the effluent at controlled intervals.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of the Consolidated Treatment System Inc., and/or its licensed agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electric Safety Authority, etc.

Model M2000A

This Nayadic Wastewater Treatment Unit is designed for a **daily design sanitary sewage flow of up to 5700 L**. It consists of a 7000 L pre-treatment septic tank, Nayadic M2000A treatment unit with a total volumetric capacity of 7.57 m^3, including an integral aeration tank equipped with a diaphragm air diffuser and a ½ HP air pump. It also includes an inner conical up welling clarifier overflowing 360-degree weir to a dosing pump chamber.

Where the percolation rate of the native subsoil is between 50 min/cm and 125 min/cm, the treatment unit shall include a 1.5 in SpinClean filter with max. 100 micron mesh screen, or a single pass free access sand filter consisting of a tank with openings accessible from grade, 100 mm distribution piping, sand filter with an area of 13.94 m^2 at 600 mm depth (sand media with 0.4 mm to 1.5 mm dia effective size with uniformity coefficient of 3), underlaid by 150 mm pea gravel and 100 mm dia. slotted collection piping discharging the effluent by gravity to a dosing chamber.

The dosing pump chamber has a volumetric capacity of 9.9 m^3 and is equipped with a minimum 0.4 HP submersible effluent pump complete with pressure activated level switches, alarm and control panel, a 1.5 in SpinClean filter with max. 100 micron mesh screen and a forcemain discharging the effluent at controlled intervals.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of the Consolidated Treatment System Inc., and/or its licensed agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electric Safety Authority, etc.

Bionest™ Treatment Systems

Model BN-400

This Bionest Treatment System is designed for **daily design sanitary sewage flow up to 1600 L.** The system requires a standard two-compartment septic tank with a volumetric capacity of 3.8 m^3 or greater with an effluent filter on the outlet to screen out particles larger than 1.6 mm, overflowing to the Bionest bioreactor through a 100 mm diameter pipe.

The Bionest bioreactor is comprised of a tank with a volumetric capacity of 3.8 m^3 of similar configuration to that of the standard two-compartment septic tank. A specific quantity of Bionest synthetic media is placed into each of the two-compartments. The media is non-toxic polymer ribbon having a relative density of 1.04. Continuous aeration of the first compartment of the bioreactor is provided by a linear air pump and fine bubble air diffusers. A recirculation pump is installed in the last compartment of the bioreactor and part of the treated effluent is returned to the septic tank. The treated effluent is directed through a 100 mm diameter pipe to a dosing chamber.

The dosing chamber has a minimum effective volume of 0.75 of the daily design flow and is equipped with a minimum 0.3 HP pump, activated by a conventional on/off float or by a control panel. The dosing chamber is monitored by an alarm float installed in the chamber and is connected to an alarm panel placed inside the building on an independent electrical circuit. The effluent from the dosing tank is discharged to a shallow buried trench.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of Bionest Technologies and/or its licensed agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Model BN-500

This Bionest Treatment System is designed for **daily design sanitary sewage flow from 1600 L to 2000 L.** The system requires a standard two-compartment septic tank with a volumetric capacity of 4.7 m^3 or greater with an effluent filter on the outlet to screen out particles larger than 1.6 mm, overflowing to the Bionest bioreactor through a 100 mm diameter pipe.

The Bionest bioreactor is comprised of a tank with a volumetric capacity of 4.7 m^3 of similar configuration to that of the standard two-compartment septic tank. A specific quantity of Bionest synthetic media is placed into each of the two-compartments. The media is non-toxic polymer ribbon having a relative density of 1.04. Continuous aeration of the first compartment of the bioreactor is provided by a linear air pump and fine bubble air diffusers. A recirculation pump is installed in the last compartment of the bioreactor and part of the treated effluent is returned to the septic tank. The treated effluent is directed through a 100 mm diameter pipe to a dosing chamber.

The dosing chamber has a minimum effective volume of 0.75 of the daily design flow and is equipped with a minimum 0.3 HP pump, activated by a conventional on/off float or by a control panel. The dosing chamber is monitored by an alarm float installed in the chamber and is connected to an alarm panel placed inside the building on an independent electrical circuit. The effluent from the dosing tank is discharged to a shallow buried trench or other approved disposal methods.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

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Model BN-600

This Bionest Treatment System is designed for **daily design sanitary sewage flow from 2000 L to 2500 L.** The system requires a standard two-compartment septic tank with a volumetric capacity of 5.1 m^3 or greater with an effluent filter on the outlet to screen out particles larger than 1.6 mm, overflowing to the Bionest bioreactor through a 100 mm diameter pipe.

The Bionest bioreactor is comprised of a tank with a volumetric capacity of 5.1 m^3 of similar configuration to that of the standard two-compartment septic tank. A specific quantity of Bionest synthetic media is placed into each of the two-compartments. The media is non-toxic polymer ribbon having a relative density of 1.04. Continuous aeration of the first compartment of the bioreactor is provided by a linear air pump and fine bubble air diffusers. A recirculation pump is installed in the last compartment of the bioreactor and part of the treated effluent is returned to the septic tank. The treated effluent is directed through a 100 mm diameter pipe to a dosing chamber.

The dosing chamber has a minimum effective volume of 0.75 of the daily design flow and is equipped with a minimum 0.3 HP pump, activated by a conventional on/off float or by a control panel. The dosing chamber is monitored by an alarm float installed in the chamber and is connected to an alarm panel placed inside the building on an independent electrical circuit. The effluent from the dosing tank is discharged to a shallow buried trench or other approved disposal methods.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

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Model BN-750

This Bionest Treatment System is designed for **daily design sanitary sewage flow from 2500 L to 3000 L.** The system requires a standard two-compartment septic tank with a volumetric capacity of 5.7 m^3 or greater with an effluent filter on the outlet to screen out particles larger than 1.6 mm, overflowing to the Bionest bioreactor through a 100 mm diameter pipe.

The Bionest bioreactor is comprised of a tank with a volumetric capacity of 5.7 m^3 of similar configuration to that of the standard two-compartment septic tank. A specific quantity of Bionest synthetic media is placed into each of the two-compartments. The media is non-toxic polymer ribbon having a relative density of 1.04. Continuous aeration of the first compartment of the bioreactor is provided by a linear air pump and fine bubble air diffusers. A recirculation pump is installed in the last compartment of the bioreactor and part of the treated effluent is returned to the septic tank. The treated effluent is directed through a 100 mm diameter pipe to a dosing chamber.

The dosing chamber has a minimum effective volume of 0.75 of the daily design flow and is equipped with a minimum 0.3 HP pump, activated by a conventional on/off float or by a control panel. The dosing chamber is monitored by an alarm float installed in the chamber and is connected to an alarm panel placed inside the building on an independent electrical circuit. The effluent from the dosing tank is discharged to a shallow buried trench or other approved disposal methods.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

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Model BN-1000

This Bionest Treatment System is designed for **daily design sanitary sewage flow from 3000 L to 4000 L.** The system requires a standard two-compartment septic tank with a volumetric capacity of 6.6 m^3 or greater with an effluent filter on the outlet to screen out particles larger than 1.6 mm, overflowing to the Bionest bioreactor through a 100 mm diameter pipe.

The Bionest bioreactor is comprised of a tank with a volumetric capacity of 6.6 m^3 of similar configuration to that of the standard two-compartment septic tank. A specific quantity of Bionest synthetic media is placed into each of the two-compartments. The media is non-toxic polymer ribbon having a relative density of 1.04. Continuous aeration of the first compartment of the bioreactor is provided by a linear air pump and fine bubble air diffusers. A recirculation pump is installed in the last compartment of the bioreactor and part of the treated effluent is returned to the septic tank. The treated effluent is directed through a 100 mm pipe to a dosing chamber.

The dosing chamber has a minimum effective volume of 0.75 of the daily design flow and is equipped with a minimum 0.5 HP pump, activated by a conventional on/off float or by a control panel. The dosing chamber is monitored by an alarm float installed in the chamber and is connected to an alarm panel placed inside the building on an independent electrical circuit. The effluent from the dosing tank is discharged to a shallow buried trench or other approved disposal methods.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

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Model BN-1250

This Bionest Treatment System is designed for **daily design sanitary sewage flow from 4000 L to 5000 L.** The system requires a standard two-compartment septic tank with a volumetric capacity of 7.6 m^3 or greater with an effluent filter on the outlet to screen out particles larger than 1.6 mm, overflowing to the Bionest bioreactor through a 100 mm diameter pipe.

The Bionest bioreactor is comprised of a tank with a volumetric capacity of 7.6 m^3 of similar configuration to that of the standard two-compartment septic tank. A specific quantity of Bionest synthetic media is placed into each of the two-compartments. The media is non-toxic polymer ribbon having a relative density of 1.04. Continuous aeration of the first compartment of the bioreactor is provided by a linear air pump and fine bubble air diffusers. A recirculation pump is installed in the last compartment of the bioreactor and part of the treated effluent is returned to the septic tank. The treated effluent is directed through a 100 mm diameter pipe to a dosing chamber.

The dosing chamber has a minimum effective volume of 0.75 of the daily design flow and is equipped with a minimum 0.75 HP pump, activated by a conventional on/off float or by a control panel. The dosing chamber is monitored by an alarm float installed in the chamber and is connected to an alarm panel placed inside the building on an independent electrical circuit. The effluent from the dosing tank is discharged to a shallow buried trench or other approved disposal methods.

This approval is only for the treatment unit component of the sewage system and the sewage system shall comply with the Ontario Building Code, as amended from time to time.

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Model BN-1500

This Bionest Treatment System is designed for **daily design sanitary sewage flow from 5000 L to 6000 L.** The system requires a standard two-compartment septic tank with a volumetric capacity of 9.5 m^3 or greater with an effluent filter on the outlet to screen out particles larger than 1.6 mm, overflowing to the Bionest bioreactor through a 100 mm diameter pipe.

The Bionest bioreactor is comprised of a tank with a volumetric capacity of 9.5 m^3 of similar configuration to that of the standard two-compartment septic tank. A specific quantity of Bionest synthetic media is placed into each of the two-compartments. The media is non-toxic polymer ribbon having a relative density of 1.04. Continuous aeration of the first compartment of the bioreactor is provided by a linear air pump and fine bubble air diffusers. A recirculation pump is installed in the last compartment of the bioreactor and part of the treated effluent is returned to the septic tank. The treated effluent is directed through a 100 mm diameter pipe to a dosing chamber.

The dosing chamber has a minimum effective volume of 0.75 the daily design flow and is equipped with a minimum 1 HP pump, activated by a conventional on/off float or by a control panel. The dosing chamber is monitored by an alarm float installed in the chamber and is connected to an alarm panel placed inside the building on an independent electrical circuit. The effluent from the dosing tank is discharged to a shallow buried trench or other approved disposal methods.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of Bionest Technologies and/or its licensed agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Model BN-2000

This Bionest Treatment System is designed for **daily design sanitary sewage flow from 6000 L to 8000 L.** The system requires a standard two-compartment septic tank with a volumetric capacity of 11.4 m^3 or greater with an effluent filter on the outlet to screen out particles larger than 1.6 mm, overflowing to the Bionest bioreactor through a 100 mm diameter pipe.

The Bionest bioreactor is comprised of a tank with a volumetric capacity of 11.4 m^3 of similar configuration to that of the standard two-compartment septic tank. A specific quantity of Bionest synthetic media is placed into each of the two-compartments. The media is non-toxic polymer ribbon having a relative density of 1.04. Continuous aeration of the first compartment of the bioreactor is provided by a linear air pump and fine bubble air diffusers. A recirculation pump is installed in the last compartment of the bioreactor and part of the treated effluent is returned to the septic tank. The treated effluent is directed through a 100 mm diameter pipe to a dosing chamber.

The dosing chamber has a minimum effective volume of 0.75 of the daily design flow and is equipped with a minimum 1 HP pump, activated by a conventional on/off float or by a control panel. The dosing chamber is monitored by an alarm float installed in the chamber and is connected to an alarm panel placed inside the building on an independent electrical circuit. The effluent from the dosing tank is discharged to a shallow buried trench or other approved disposal methods.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of Bionest Technologies and/or its licensed agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Model BN-2650

This Bionest Treatment System is designed for **daily design sanitary sewage flow from 8000 L to 10 000 L.** The system requires a standard septic tank with a volumetric capacity of 15 m^3 or greater with an effluent filter on the outlet to screen out particles larger than 1.6 mm, overflowing to the Bionest bioreactor through a 100 mm diameter pipe.

The Bionest bioreactor is comprised of a tank with a volumetric capacity of 15.1 m^3 of similar configuration to that of the standard two-compartment septic tank. A specific quantity of Bionest synthetic media is placed into each of the two-compartments. The media is non-toxic polymer ribbon having a relative density of 1.04. Continuous aeration of the first compartment of the bioreactor is provided by a linear air pump and fine bubble air diffusers. A recirculation pump is installed in the last compartment of the bioreactor and part of the treated effluent is returned to the septic tank. The treated effluent is directed through a 100 mm diameter pipe to a dosing chamber.

The dosing chamber has a minimum effective volume of 0.75 of the daily design flow and is equipped with a minimum 1 HP pump, activated by a conventional on/off float or by a control panel. The dosing chamber is monitored by an alarm float installed in the chamber and is connected to an alarm panel placed inside the building on an independent electrical circuit. The effluent from the dosing tank is discharged to a shallow buried trench or other approved disposal methods.

This approval is only for the treatment unit component of the sewage system and **the sewage system shall comply with the Ontario Building Code, as amended from time to time.**

It is the responsibility of Bionest Technologies and/or its licensed agents to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

m) Ecoflo Biofilter Treatment Systems Housed in a Concrete Shell

Model Ecoflo ST-500B-PF Biofilter

This Ecoflo Biofilter Treatment Unit is designed for **daily design sanitary sewage flow of 850 L to 1500 L**. The system requires a standard septic tank complete with an effluent filter on the outlet to screen out particles larger than 1.6 mm, overflowing to a pump chamber.

The pump chamber has a minimum effective holding capacity of one times the daily design flow, equipped with a minimum 0.3 HP pump complete with level switches, alarm and control panel with a minimum 38 mm dia. discharge pipe, ball valve and a flow controller, terminating in an Ecoflo ST-650B Biofilter unit.

The Ecoflo® ST-650B Biofilter unit consists of approximately 4 m^3 of compact high-performance peat-based biofilter medium confined in a concrete shell.

The treated effluent is collected and stored in the collecting layer underneath the filtering media. The model has an effective integrated storage capacity that is equivalent to 0.9 times the daily design flow. The treated effluent is directed towards an integrated pump vault, equipped with a minimum 0.3 HP effluent pump, through a drainage system located at the bottom of the concrete shell. The pump is activated by a control panel for time dosing, and is equipped with an on\off float and alarm float installed in the chamber. The alarm float is connected to an alarm panel placed inside the building on an independent electrical circuit. The treated effluent is then dosed to a shallow buried trench system.

This approval is only for the treatment capability of the treatment unit. **The sewage system and its components shall comply with the Building Code, as amended from time to time**.

It is the responsibility of Premier Tech Environment and/or its licensed agents, to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Model Ecoflo ST-500B-GF Biofilter

This Ecoflo Biofilter Treatment Unit is designed for **daily design sanitary sewage flow of 850 L to 1500 L**. The system requires a standard septic tank complete with an effluent filter on the outlet to screen out particles larger than 1.6 mm, overflowing to the Ecoflo ST-650B Biofilter unit.

The effluent from the septic tank is fed by gravity over the peat media through a tipping-bucket and distribution plates.

The Ecoflo® ST-500B Biofilter unit consists of approximately 4 m^3 of compact high-performance peat-based biofilter medium confined in a concrete shell.

The treated effluent is collected and stored in the collecting layer underneath the filtering media. The model has an effective integrated storage capacity that is equivalent to 0.9 times the daily design flow. The treated effluent is directed towards an integrated pump vault, equipped with a minimum 0.3 HP effluent pump, through a drainage system located at the bottom of the concrete shell. The pump is activated by a control panel for time dosing, and is equipped with an on\off float and alarm float installed in the chamber. The alarm float is connected to an alarm panel placed inside the building on an independent electrical circuit. The treated effluent is then dosed to a shallow buried trench system.

This approval is only for the treatment capability of the treatment unit. **The sewage system and its components shall comply with the Building Code, as amended from time to time.**

It is the responsibility of Premier Tech Environment and/or its licensed agents, to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Model Ecoflo ST-650B-PF Biofilter

This Ecoflo Biofilter Treatment Unit is designed for **daily design sanitary sewage flow of 850 L to 2200 L**. The system requires a standard septic tank complete with an effluent filter on the outlet to screen out particles larger than 1.6 mm, overflowing to a pump chamber.

The pump chamber has a minimum effective holding capacity of one time the daily design flow, equipped with a minimum 0.3 HP pump, complete with level switches, alarm and control panel with a minimum 38 mm dia. discharge pipe, ball valve and a flow controller, terminating in an Ecoflo ST-650P Biofilter unit.

The Ecoflo® ST-650P Biofilter unit consists of approximately 5 m^3 of compact high performance peat based biofilter medium confined in a concrete shell.

The treated effluent is collected and stored in the collecting layer underneath the filtering media. The model has an effective integrated storage capacity that is equivalent to 0.9 times the daily design flow. The treated effluent is directed towards an integrated pump vault, equipped with a minimum 0.3 HP effluent pump, through a drainage system located at the bottom of the concrete shell. The pump is activated by a control panel for time dosing, and is equipped with an on\off float and alarm float installed in the chamber. The alarm float is connected to an alarm panel placed inside the building on an independent electrical circuit. The treated effluent is then dosed to a shallow buried trench system.

This approval is only for the treatment capability of the treatment unit. **The sewage system and its components shall comply with the Building Code, as amended from time to time.**

It is the responsibility of Premier Tech Environment and/or its licensed agents, to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Model Ecoflo ST-650B-GF Biofilter

This Ecoflo Biofilter Treatment Unit is designed for **daily design sanitary sewage flow of 850 L to 2200 L**. The system requires a standard septic tank complete with an effluent filter on the outlet to screen out particles larger than 1.6 mm, overflowing to the Ecoflo ST-650B Biofilter unit.

The effluent from the septic tank is fed by gravity over the peat media through a tipping-bucket and distribution plates.

The Ecoflo® ST-650B Biofilter unit consists of approximately 5 m^3 of compact high performance peat based biofilter medium confined in a concrete shell.

The treated effluent is collected and stored in the collecting layer underneath the filtering media. The model has an effective integrated storage capacity that is equivalent to 0.9 times the daily design flow. The treated effluent is directed towards an integrated pump vault, equipped with a minimum 0.3 HP effluent pump, through a drainage system located at the bottom of the concrete shell. The pump is activated by a control panel for time dosing, and is equipped with an on\off float and alarm float installed in the chamber. The alarm float is connected to an alarm panel placed inside the building on an independent electrical circuit. The treated effluent is then dosed to a shallow buried trench system.

This approval is only for the treatment capability of the treatment unit. **The sewage system and its components shall comply with the Building Code, as amended from time to time.**

It is the responsibility of Premier Tech Environment and/or its licensed agents, to ensure that units meet all other applicable standards. Other standards may include those of the Canadian Standards Association, Ontario Ministry of Labour, Electrical Safety Authority, etc.

Ministry of Municipal Affairs and Housing
Building and Development Branch

Ontario

2006 Building Code – Supplementary Standards

Supplementary Standard
SB-6

Supplementary Standard SB-6

Percolation Time and Soil Descriptions

August 15, 2006

COMMENCEMENT

Supplementary Standard SB-6 comes into force on the 31st day of December, 2006.

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SB-6 Percolation Time and Soil Descriptions

ESTIMATION OF PERCOLATION TIME

(a) The purpose of this Section and the associated Tables and Charts is to provide assistance to those who must decide on the percolation time(s) to be used in design. Suggested relationships between percolation time, coefficient of permeability and soils of various types are given. IT MUST BE EMPHASIZED THAT, PARTICULARLY FOR FINE GRAINED SOILS, THERE IS NO CONSISTENT RELATIONSHIP DUE TO THE MANY FACTORS INVOLVED. The following guidance is presented for the soil types outlined in the Unified Soil Classification System (Table 1). In order to assess a particular soil,

- (i) Table 2 and Table 3 - Approximate relationship of soil types to permeability and percolation time.
- (ii) Charts 1 to 14 - Typical grain size distribution curves for soil types in the Unified Soil Classification System.

(b) In Table 2 and Table 3, a range of values of "K" and of "T" are given for various soil descriptions. The principal modifiers which will influence selection of a "T" value within the range given are:

- (i) The structure - "massive" fine-grained soils have high values of "T".
- (ii) The density - For a given soil higher density produces a higher value of "T".
- (iii) The percentage of clay - the higher the percentage the higher the value of "T".
- (iv) The mineralogy of the clay portion - The more it "swells" the higher the value of "T".
- (v) The plasticity of the soil - The higher the plasticity index the higher the value of "T".
- (vi) Liquid Limit - the higher the liquid limit the higher the value of "T".
- (vii) Organic content - The presence of fine organic particles, detectable by colouration and odour, can significantly reduce the permeability and raise the value of "T".

Table 1
Unified Soil Classification

Coarse - Grained Soils		Fine - Grained Soils	
Group Symbols	Typical Names	Group Symbols	Typical Names
GW	Well-graded gravels, gravel-sand mixtures, little or no fines	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
GM	Silty gravels, gravel-sand-silt mixtures	OL	Organic silts and organic silty clays of low plasticity
GC	Clayey gravels, gravel-sand-clay mixtures	MH	Inorganic silts, micoceous or diatomaceous fine sandy or silty soils, elastic silts
SW	Well-graded sands, gravelly sands, little or no fines	CH	Inorganic clays of high plasticity, fat clays
SP	Poorly-graded sands, gravelly sands, little or no fines	OH	Organic clays of medium to high plasticity, organic silts
SM	Silty sands, sand-silt mixtures		
SC	Clayey sands, sand-clay mixtures	PT (highly organic soils)	Peat and other highly organic soils
Column 1	2	3	4

Table 2
Approximate Relationship of Coarse Grained Soil Types to Permeability and Percolation Time

Soil Type (Unified Soil Classification)	Coefficient of Permeability, K - cm/sec	Percolation Time, T - mins/cm	Comment
Coarse Grained More than 50% Larger than #200			
G.W. - Well graded gravels, gravel-sand mixtures, little or no fines.	10^{1}	<1	very permeable unacceptable
G.P. - Poorly graded gravels, gravel-sand mixtures, little or no fines.	10^{1}	<1	very permeable unacceptable
G.M. - Silty gravels, gravel-sand-silt mixtures.	10^{2} - 10^{4}	4 - 12	Permeable to medium permeable depending on amount of silt.
G.C. - Clayey gravels, gravel-sand-clay mxtures.	10^{4} - 10^{6}	12 - 50	Important to estimate amount of silt and clay
S.W. - Well graded sands, gravelly sands little orno fines.	10^{1} - 10^{4}	2 - 12	medium permeability
S.P. - Poorly graded sands, gravelly sand, little or no fines.	10^{1} - 10^{3}	2 - 8	medium permeability
S.M. - Silty sands, sand-silt mixtures	10^{3} - 10^{5}	8 - 20	medium to low permeability
S.C. - Clayey sands, sand-clay mixtures.	10^{4} - 10^{6}	12 - 50	medium to low permeability depending on amount of clay
Column 1	2	3	4

Table 3
Approximate Relationship of Fine Grained Soil Types to Permeability and Percolation Time

Soil Type (Unified Soil Classification) Fine Grained More than 50% Passing #200	Coefficient of Permeability, K - cm/sec	Percolation Time, T - mins/cm	Comment
M.L. - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, clayey silts with slight plasticity	$10^{[illegible]}$ - $10^{[illegible]}$	20 - 50	medium to low permeability
C.L. - Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	$10^{[illegible]}$ and less	over 50	unacceptable
O.L. - Organic silts, organic silty clays of low plasticity, liquid limit less than 50	$10^{[illegible]}$ and less	20 - over 50	acceptable depends on clay content
M.H. - Inorganic silts, micareaous or diatomageous fine sandy or silty soils, elastic silts	$10^{[illegible]}$ and less	over 50	unacceptable
C.H. - Inorganic clays of medium to high plasticity, organic silts	$10^{[illegible]}$ and less	over 50	unacceptable
O.H. - Organic clays of medium to high plasticity organic silt; liquid limit over 50	-$10^{[illegible]}$ and less	over 50	unacceptable
Column 1	2	3	4

SELECTION OF "T" TIME FROM THE ABOVE TABULATION

A range of "T" times for each soil type is shown above. Select from within this range by determining if the soil is within the low, middle or high part of the range considering the soil identifiers and soil characteristics. Consider structure, density, colour, prevalence or organics, the clay content and mineralogy, the plasticity index and liquid limit and the functioning of existing systems in similar soils in the area.

Notes:

The following Ministry of the Environment Reports provide further information on the relationship between grain size, coefficient of permeability and percolation time.

1. "Study on the Feasibility of Correlating Percolation Time with Laboratory Permeability" - 1975 - Research Report No. S56 by H. T. Chan, PhD., P.Eng.

2. "Study of Conventional Tile Fields in Fine-Grained Soils" - 1979 Research Report 74 by H. T. Chan, PhD., P.Eng.

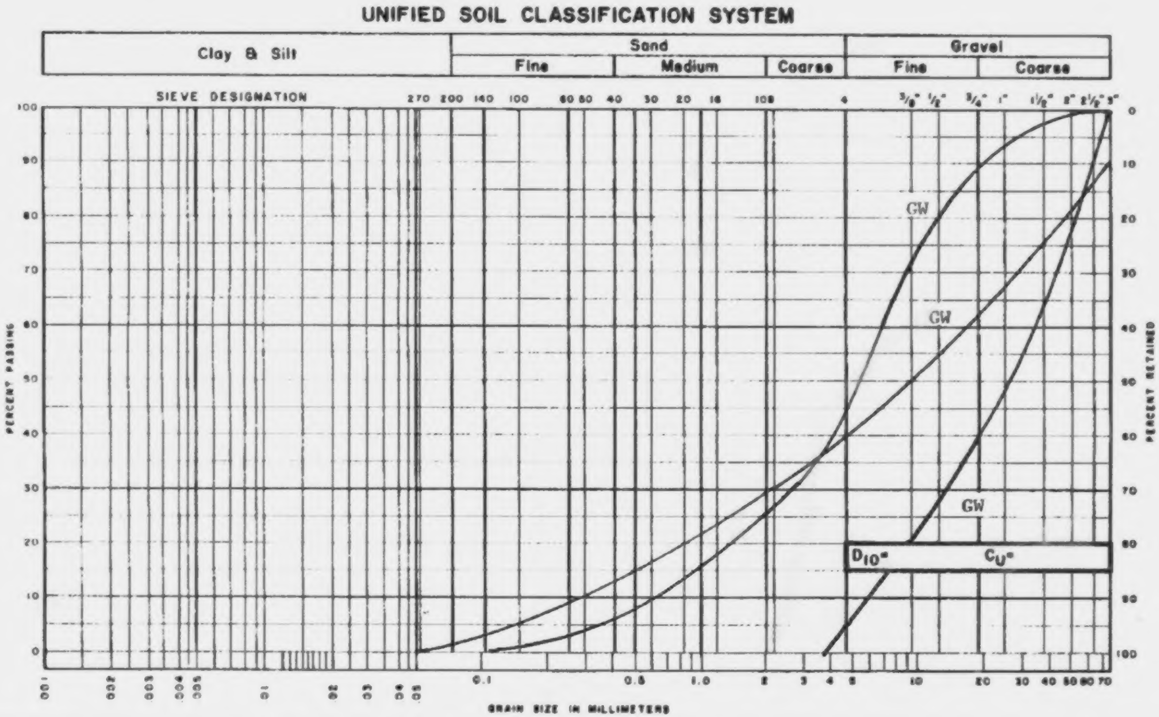


Chart 1 - GW

- Well-graded gravels, gravel-sand mixtures
- Less than 5% finer than 0.074 mm
- Uniformity coefficient > 4

UNIFIED SOIL CLASSIFICATION SYSTEM

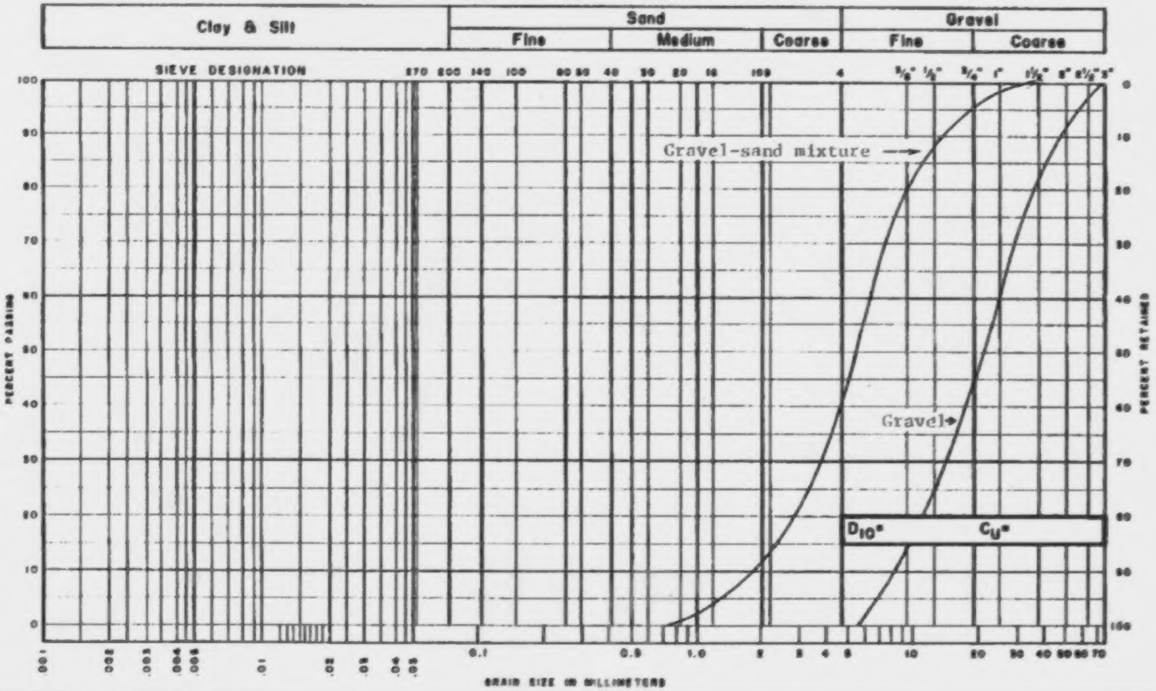


Chart 2 - GP
- Poorly-graded gravels, gravel-sand mixtures
- Less than 5% finer than 0.074 mm
- Uniformity coefficient less than 4

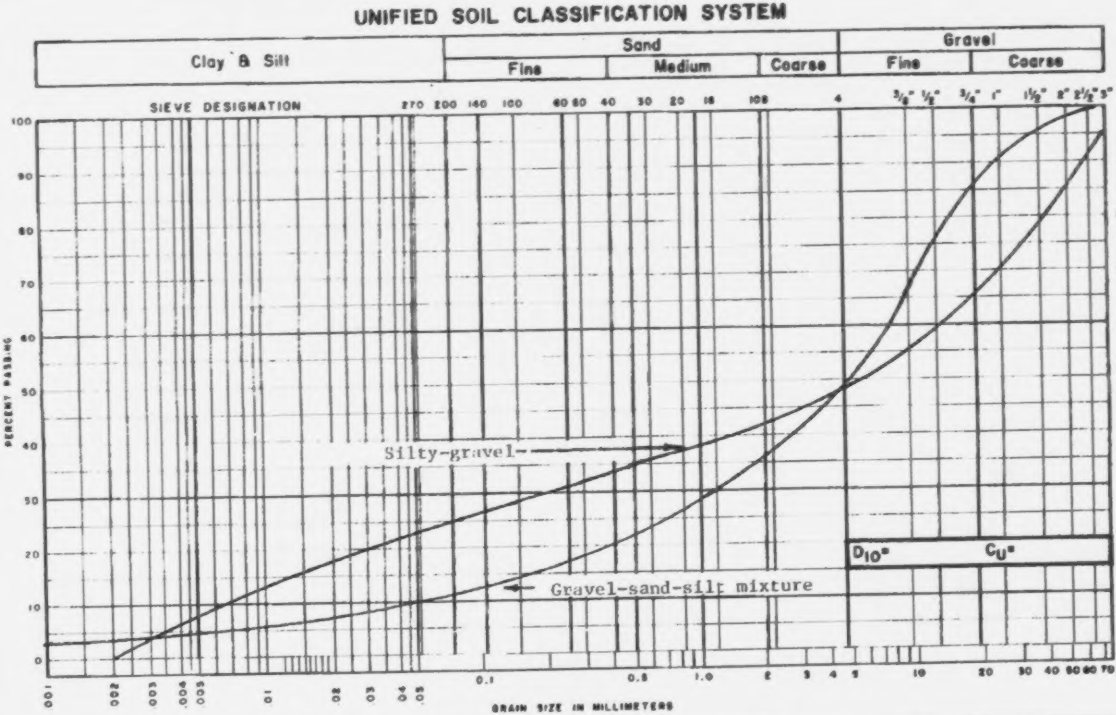


Chart 3 - GM

- Silty-gravels, gravel-sand-silt mixtures
- More than 12% finer than 0.074 mm
- Non-plastic - plasticity index less than 4
- Plots below "A" line on plasticity chart

UNIFIED SOIL CLASSIFICATION SYSTEM

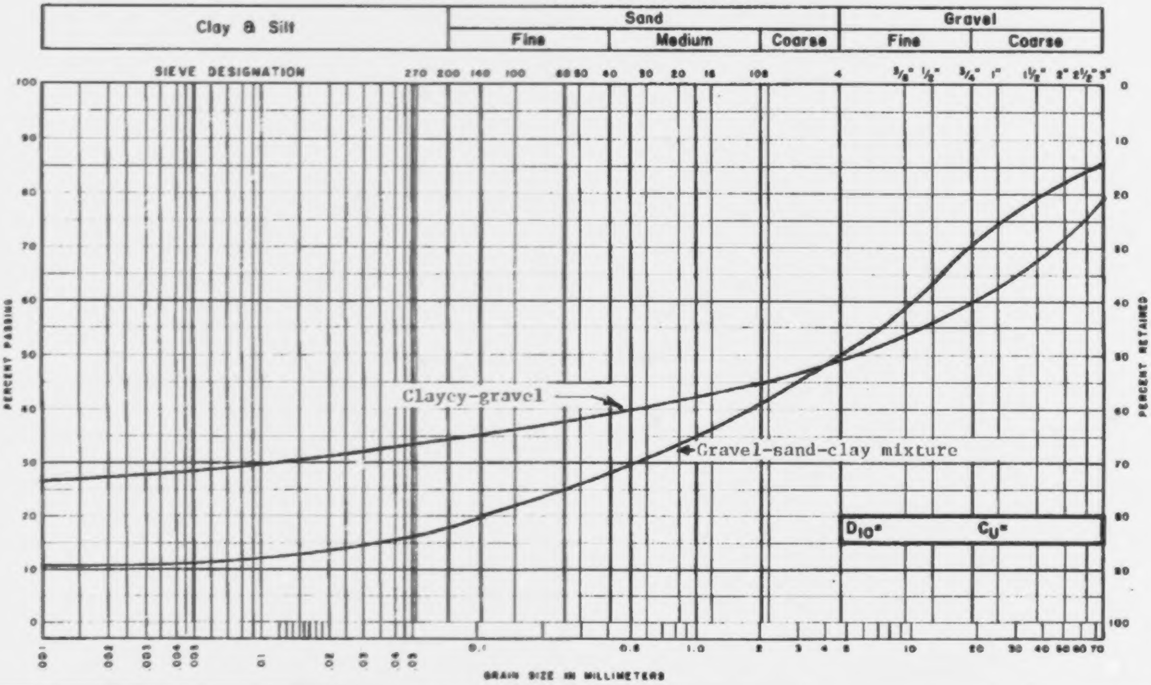


Chart 4 - GC
- Clayey-gravels, gravel-sand-clay mixtures
- More than 12% finer than 0.074 mm
- Plasticity index greater than 7
- Plots above "A" line on plasticity charts

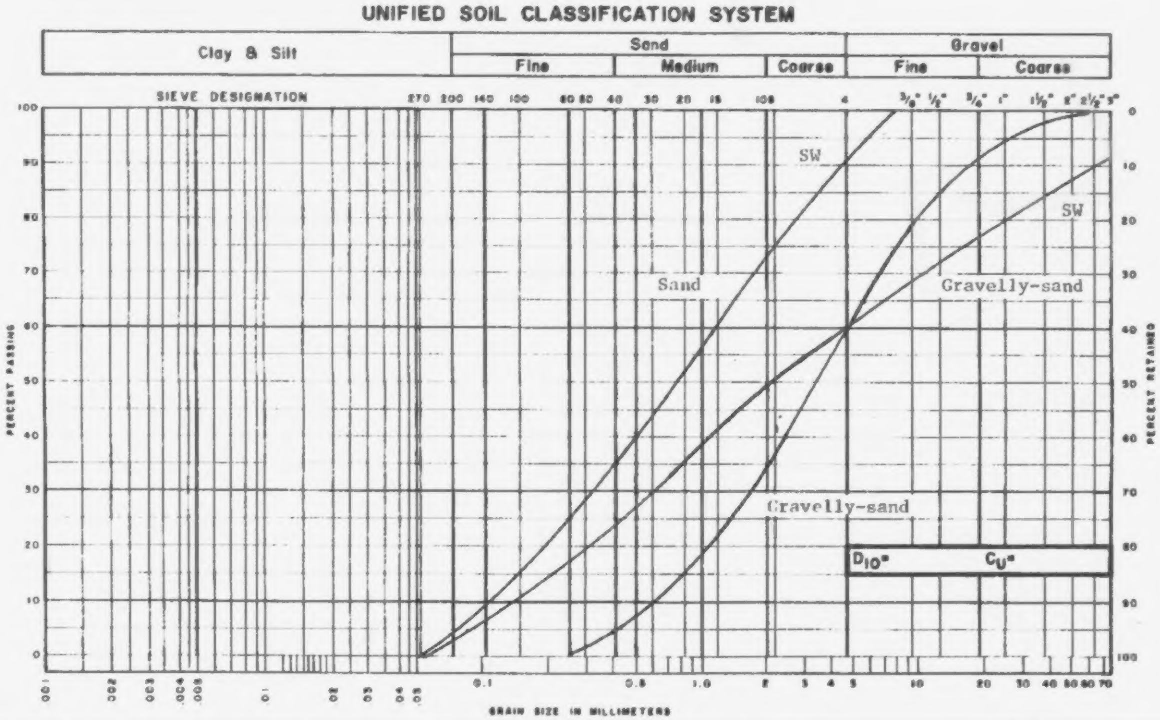


Chart 5 - SW
- Well-graded sands, gravelly-sands
- Little or no fines (< 5% passing 0.074 mm)
- Uniformity coefficient > 4

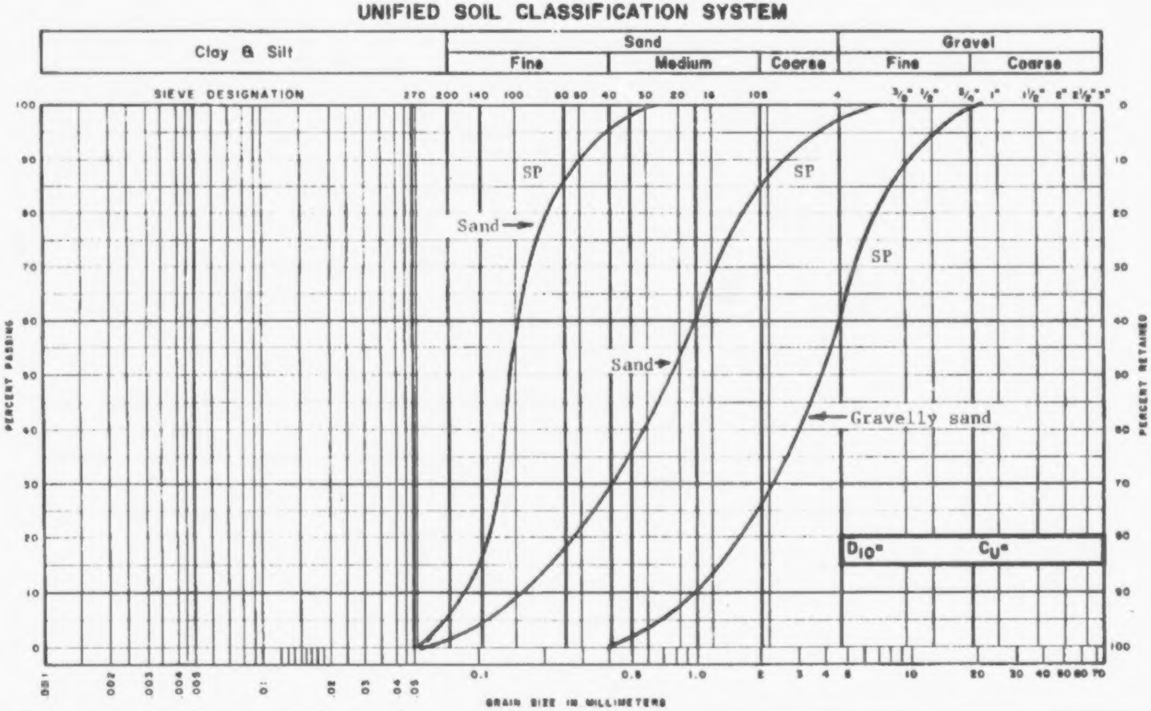


Chart 6 - SP
- Poorly-graded sands & gravelly-sands
- Little or no fines (< 5% passing 0.074 mm)
- Uniformity coefficient < 6

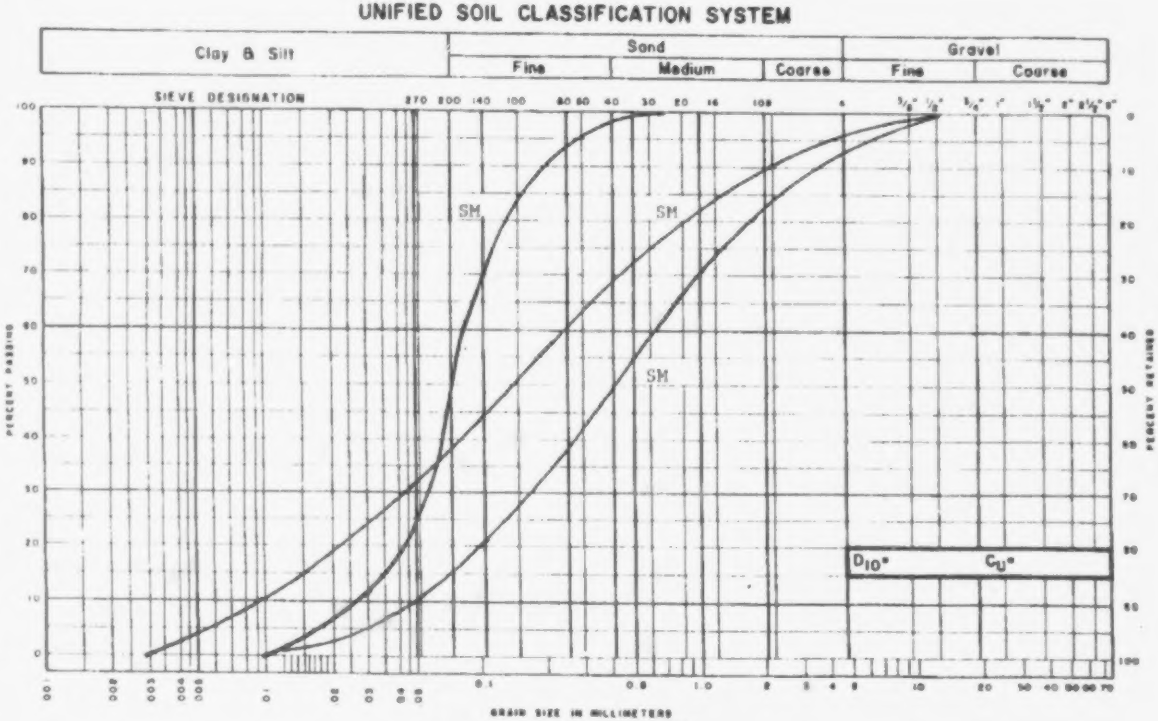


Chart 7 - SM

- Silty sands, sand-silt mixtures
- More than 12% finer than 0.074 mm
- Plasticity Index (Ip) less than 4
- Plots below "A" line on plasticity chart

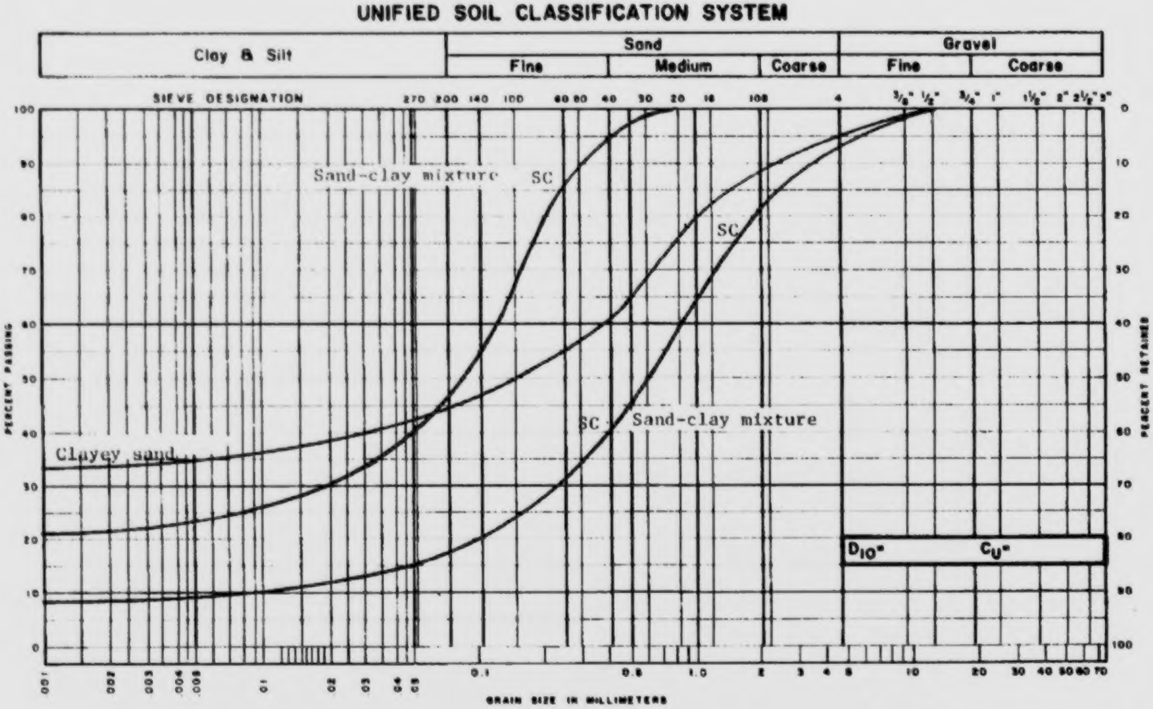


Chart 8 - SC
- Clayey sands, sand-clay mixtures
- More than 12% finer than 0.074 mm
- Plasticity index greater than 7
- Plots above "A" line on plasticity chart

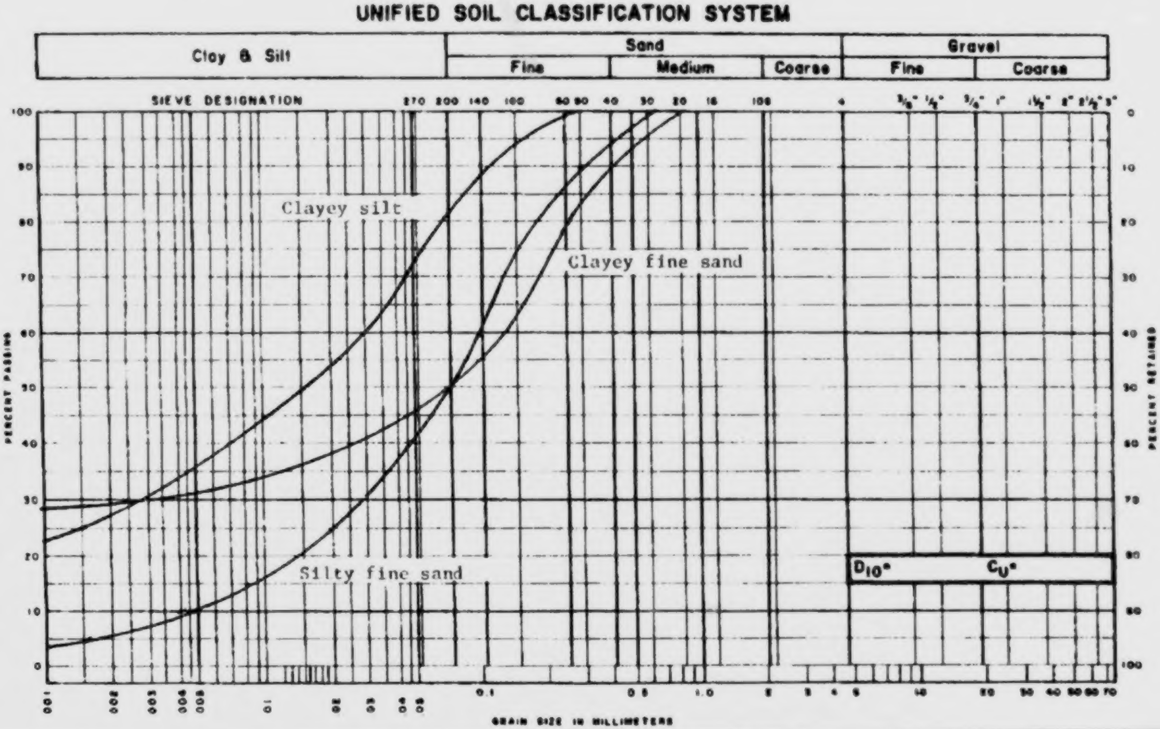
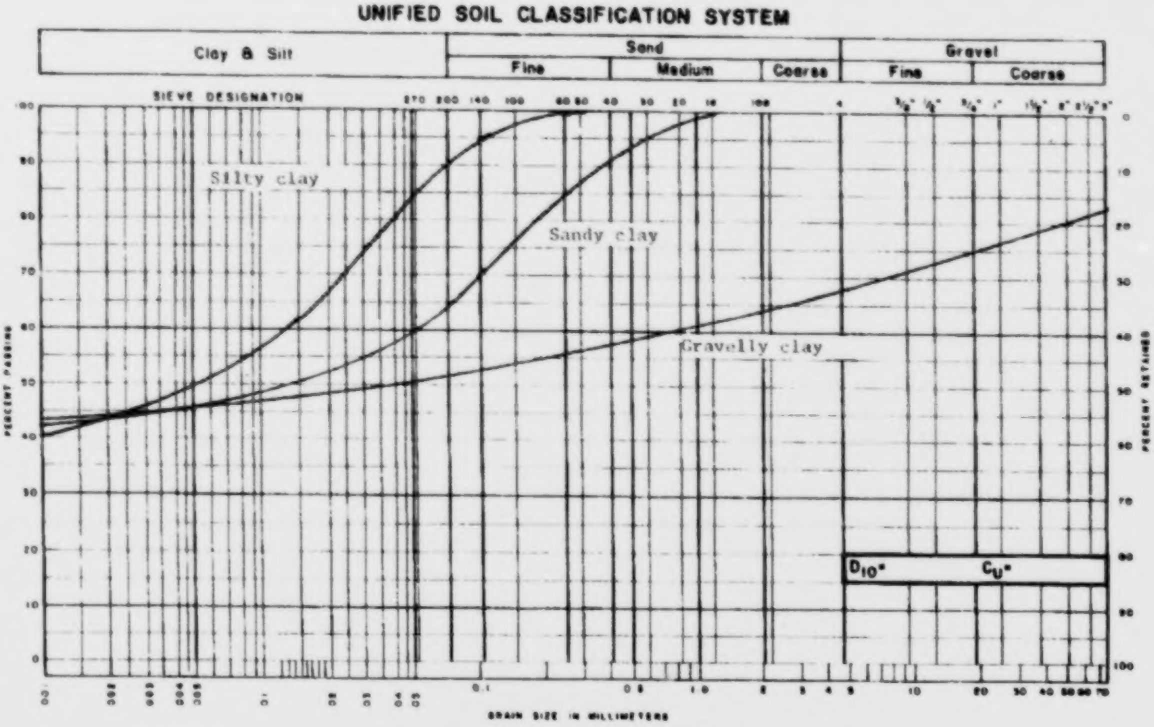


Chart 9 - ML
- Inorganic silts and very fine sands, rock floor, silty or clayey fine sands or clayey silts with slight plasticity Wl less than 50



- Inorganic clays of low to medium plasticity, gravelly clays, sandy clays silty clays, lean clays WI less than 50

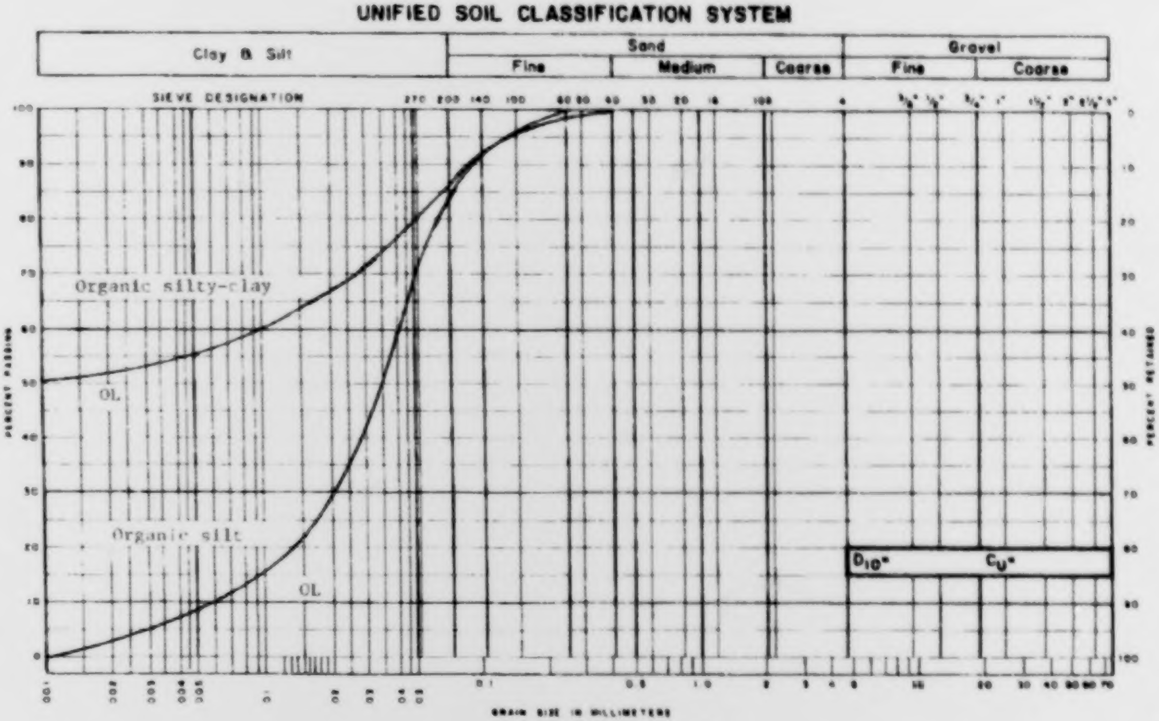


Chart 11 - OL
- Organic silts, organic silty-clays of low plasticity
Liquid limit Wl less than 50

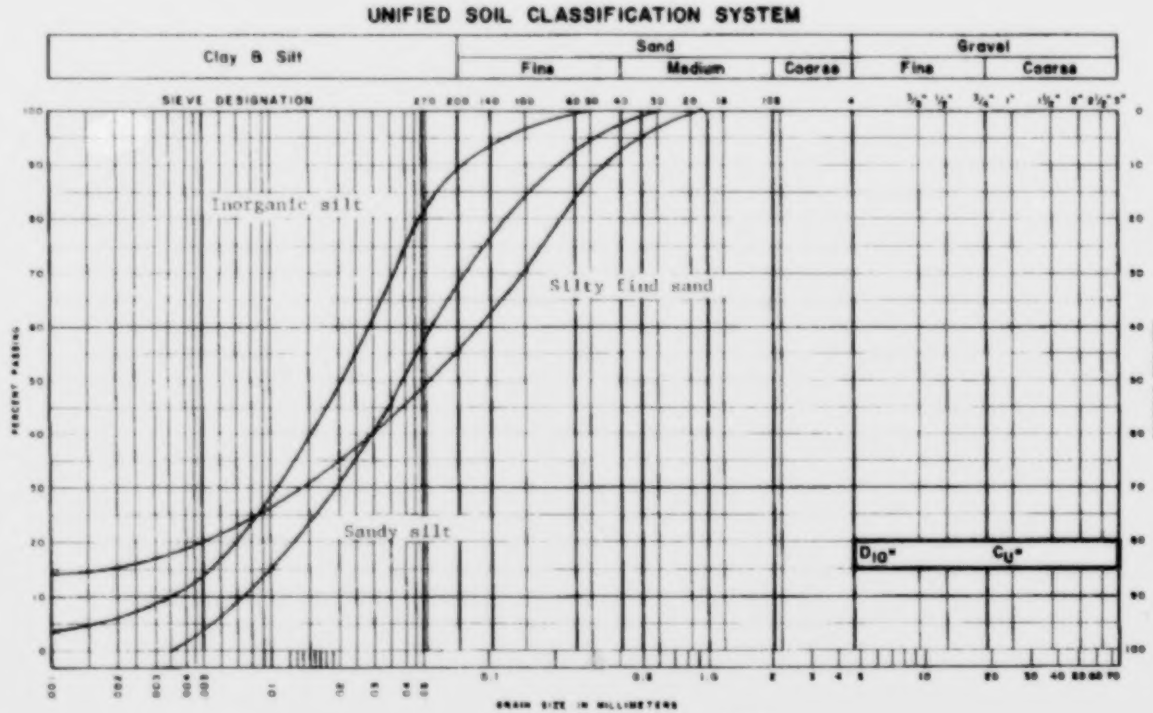


Chart 12 - MH
- Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
Liquid limit over 50

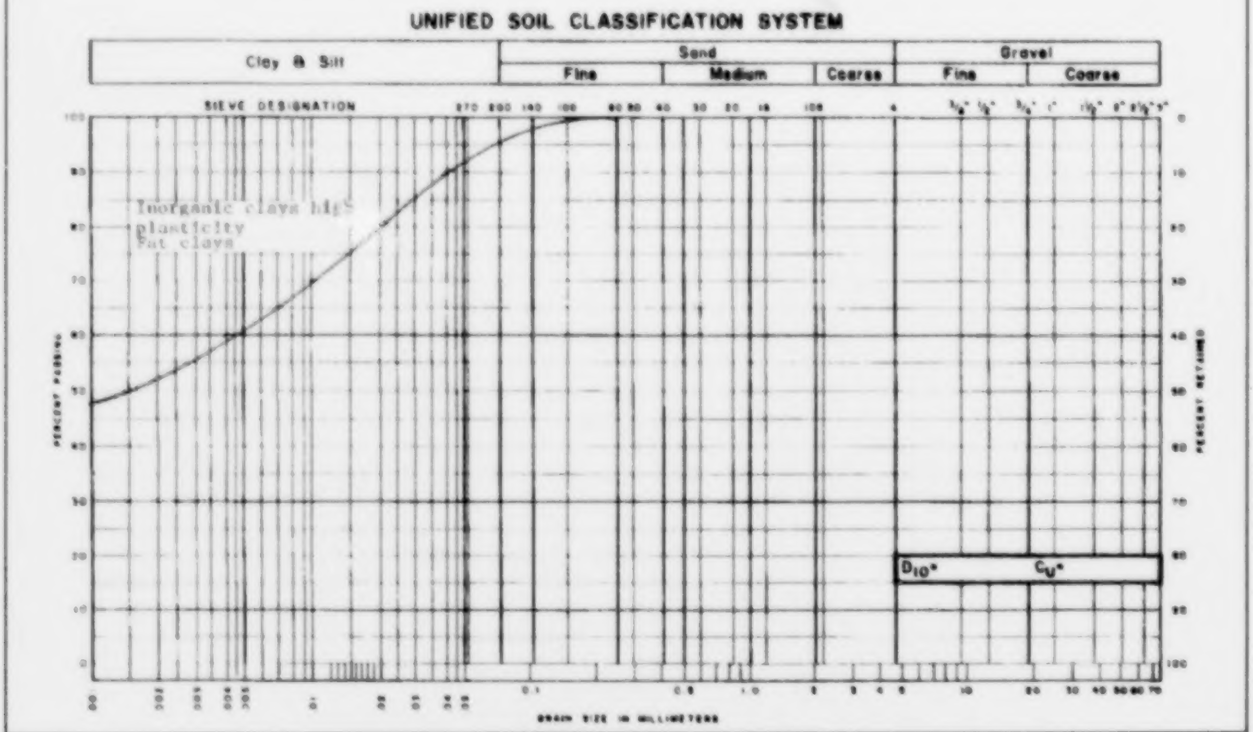


Chart 13 - CH
- Inorganic clays of high
plasticity - fat clays
Liquid limit over 50

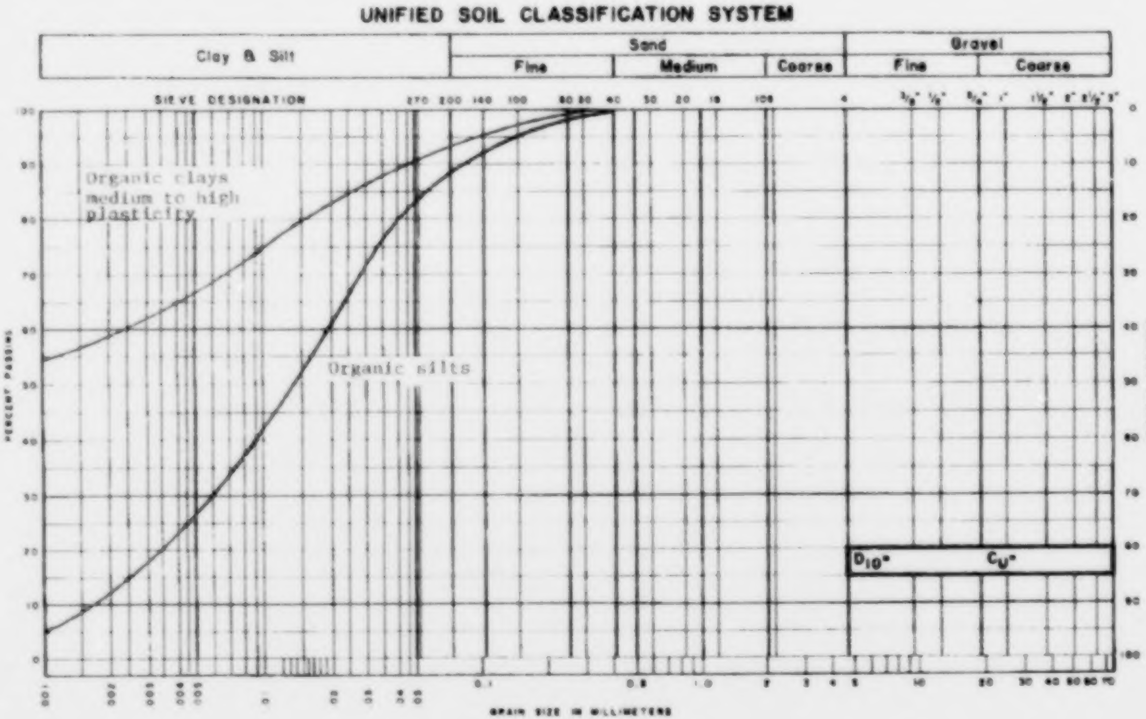


Chart 14 - OH

- Organic clays - medium to high plasticity
Organic silts
Liquid limit over 50

Ministry of Municipal Affairs and Housing
Building and Development Branch

Ontario

2006 Building Code - Supplementary Standards

Supplementary Standard
SB-7

Supplementary Standard SB-7

Guards for Housing and Small Buildings

August 15, 2006

COMMENCEMENT

Supplementary Standard SB-7 comes into force on the 31st day of December, 2006.

ERRATA

e_1 Issued April 2nd, 2007.

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SB-7 Guards for Housing and Small Buildings

Section 1 General

1.1. Introduction

1.1.1. Scope

(See Appendix A.)

(1) This Supplementary Standard includes details for the construction of wood guards.

(2) Guards located on the exterior of a building, where they may be subject to deterioration, shall be constructed in accordance with Section 2 of this Supplementary Standard. (See Appendix A.)

(3) Guards located inside a building shall be constructed in conformance with Section 2 or Section 3 of this Supplementary Standard.

1.2. Design of Guards

1.2.1. Cantilever Action

(1) The construction details for guards in this Supplementary Standard are based on the assumption that the guard acts as a cantilever in resisting lateral loads. (See Appendix A.)

1.2.2. Classification

(1) The structural systems of guards described in this Supplementary Standard are grouped into the following classifications:
(a) Post and Rail Systems, and
(b) Cantilevered Picket Systems.
(See Appendix A.)

Section 2 Exterior Guards

2.1. Materials

2.1.1. Lumber Grades

(1) The minimum grade of softwood dimension lumber for posts, rails and joists shall be Northern Species, No. 2.

(2) The minimum grade of softwood dimension lumber for pickets shall be Northern Species, No. 2 Picket grade.

(3) Wood for pickets shall be free of loose knots.
(See Appendix A.)

2.1.2. Lumber Dimensions

(1) Except as permitted in Sentence (2), the minimum sizes of loadbearing elements of wood guards shall conform to Table 2.1.2.

Table 2.1.2.
Minimum Size of Loadbearing Elements

Guard Element	Minimum Size, mm (in)
Post	89 x 89 (4" x 4" nominal)
Top Rail	38 x 89 (2" x 4" nominal)
Bottom Rail	38 x 89 (2" x 4" nominal)
Picket / Baluster	32 x 32 ($1^{9}/_{32}$" x $1^{9}/_{32}$")
Column 1	2

(2) Where a bottom rail is bevelled, the minimum sizes shown in Table 2.1.2. may be reduced to allow for a bevel, as detailed in Figure 2.1.2.

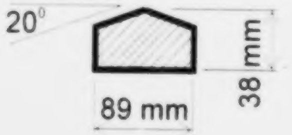


Figure 2.1.2.
Bevel Detail

2.1.3. Floor Construction

(1) The minimum dimensions of wood floor joists and wood decking shall conform to Table 2.1.3.

(2) Except as provided in Details EA-1 to ED-5, wood decking shall be fastened to each floor joist with nailing conforming to Table 2.1.3.

(See Appendix A.)

Table 2.1.3.
Minimum Size of Floor Elements

Floor Element	Minimum size, mm (in)
Dimension Lumber Decking	25 x 140 (^{5}/4" x 6" nominal) when each is plank fastened with 2 - 63 mm (2½") nails
	38 x 89 (2" x 4" nominal) when each plank is fastened with 2 - 76 mm (3") nails
Dimension Lumber Joists	38 x 184 (2" x 8" nominal)
Column 1	2

2.1.4. Connectors

(1) Nails, screws, lag bolts and machine bolts shall not cause splitting of wood elements.

(2) Fasteners shall be resistant to corrosion.

(3) All nails shall be common spiral.

(See Appendix A.)
(See also A-2.1.4. in Appendix A. for glued joints.)

2.1.5. Decay-Resistant Lumber

(1) Lumber for guard systems and floor systems shall be
(a) a species resistant to decay,
(b) preservative treated to prevent decay, or
(c) pressure-treated.
(See Appendix A.)

(2) All cut ends of preservative treated lumber shall be treated to prevent decay.

2.2. Structural Details

2.2.1. Post and Rail System

(1) An exterior guard constructed as a Post and Rail System shall conform to the applicable connection details listed in Table 2.2.1.

2.2.2. Cantilevered Picket System

(1) An exterior guard constructed as a Cantilevered Picket System shall conform to the applicable connection details listed in Table 2.2.2.

Table 2.2.1.
Exterior Post and Rail System Connection Details

Connection Detail	Detail Number	Description
Top Rail to Post and/or Bottom Rail to Post	EA-1	Top rail nailed to post
	EA-2	Top/bottom rail skew nailed to post with 76 mm (3") nails
	EA-3	Top/bottom rail skew nailed to post with 63 mm (2½") nails
	EA-4	Top/bottom rail face nailed or screwed to post
	EA-5	Top/bottom rail fastened to post with framing anchors
Post to Floor	EB-1	Post nailed to rim joist
	EB-2	Post screwed to rim joist
	EB-3	Post bolted to floor joist with 8 mm (5/16") machine bolts
	EB-4	Post bolted to floor joist with 9.5 mm (3/8") machine bolts
	EB-5	Post bolted to 2 floor joists
	EB-6	Post fastened to floor, where guard is parallel to floor joists
Infill Picket	EC-1	Picket nailed to endcap, endcap screwed to rail
	EC-2	Picket nailed to rail
	EC-3	Picket screwed to rail
	EC-4	Picket screwed to top rail and rim joist
Column 1	2	3

Table 2.2.2.
Exterior Cantilevered Picket System Connection Details

Connection Detail	Detail Number	Description
Cantilevered Picket (Douglas Fir-Larch, Spruce-Pine-Fir, Hem-Fir Species)	ED-1	Picket screwed to rim joist
	ED-2	Picket screwed to rim joist, where guard is parallel to floor joists
Cantilevered Picket (Northern Species)	ED-3	Picket screwed to rim joist and deck
	ED-4	Picket screwed to rim joist and deck, where guard is parallel to floor joists
Cantilevered Picket (Douglas Fir-Larch, Spruce-Pine-Fir, Hem-Fir Species, Northern Species)	ED-5	Corner
Column 1	2	3

Section 3 Interior Guards

3.1. Materials

3.1.1. Lumber and Wood Products

(1) Lumber species used for a primary loadbearing element in a guard shall be a species listed in the Table 3.1.2.

(2) Except as provided in Sentence (4), the minimum grade of softwood dimension lumber for posts, rails and joists shall be Northern Species, No. 2.

(3) Except as provided in Sentence (4), the minimum grade of softwood dimension lumber for cantilevered pickets shall be Northern Species, No. 2 Picket grade.

(4) White pine and hemlock lumber used for posts, rails and non-cantilevered pickets shall be clear straight grain material.

(5) Oak, maple and yellow poplar lumber used for posts, rails and pickets shall be clear straight grain material.

3.1.2. Lumber Dimensions

(1) The minimum sizes of loadbearing elements of wood guards shall conform to Table 3.1.2.

3.1.3. Floor Construction

(1) The minimum dimensions of wood floor joists and wood subflooring shall conform to Table 3.1.3. (See A-2.1.3. in Appendix A.)

3.1.4. Connectors

(1) Nails, screws, lag bolts and machine bolts shall not cause splitting of the wood elements. (See A-2.1.4. in Appendix A.) (See also A-2.1.4. in Appendix A for glued joints.)

3.2. Structural Details

3.2.1. Post and Rail System

(1) An interior guard constructed as a Post and Rail System shall conform to the applicable connection details listed in Table 3.2.1.

3.2.2. Cantilevered Picket System

(1) An interior guard constructed as a Cantilevered Picket System shall conform to the applicable connection details listed in Table 3.2.2.

3.2.3. Guards for Stairs

(1) An interior guard for a stair shall conform to the appropriate connection details listed in Table 3.2.3.

Table 3.1.2.
Minimum Size of Loadbearing Elements

Guard Element	Species	Minimum Size, mm (in)	Detail Number[1]
Post	Oak, Maple	70 x 70 (2¾" x 2¾") Base, 45 (1¾") Turned Diameter	IB-1, IG-1, IG-2, IG-3
	Hemlock, White Pine, Yellow Poplar	82 x 82 (3¼" x 3¼") Base, 50 (2") Turned Diameter	IB-1, IG-1, IG-2, IG-3
Post in a Volute	Oak, Maple	70 x 70 (2¾" x 2¾") Base, 50 (2") Turned Diameter	IG-4
Top Rail	Oak, Maple	41 x 67 (1⅝" x 2⅝")	IA-1, IF-1
Bottom Rail	Oak, Maple	41 x 67 (1⅝" x 2⅝")	
		19 x 67 (¾" x 2⅝"), if continuously supported	
Infill Picket	Oak, Maple	20 (¾") Diameter	IC-1, IC-2
	Yellow Poplar	22 (⅞") Diameter	
	White Pine, Hemlock	24 (31/32") Diameter	
Picket in a Volute	Oak, Maple	32 x 32 (1 7/32" x 1 7/32") Base, 20 (¾") Turned Diameter	IG-4
	Yellow Poplar	45 x 45 (1¾" x 1¾") Base, 22 (⅞") Turned Diameter	IG-5, IG-6
	White Pine, Hemlock	45 x 45 (1¾" x 1¾") Base, 24 (31/32") Turned Diameter	
Cantilevered Picket	Northern Species, Douglas Fir-Larch, Spruce-Pine-Fir, Hem-Fir, Hardwood	32 x 32 (1 7/32" x 1 7/32")	IE-1, IH-1
Column 1	2	3	4

Notes to Table 3.1.2.:

1. This column lists details that incorporate the guard elements specified in this Table.

Table 3.1.3.
Minimum Size of Floor Elements

Floor Element	Minimum size, mm (in)
Subfloor	15.5 (⅝") plywood or equivalent
Dimension Lumber Joists	38 x 184 (2" x 8" nominal)
Column 1	2

e1

Table 3.2.1.
Interior Post and Rail System Connection Details

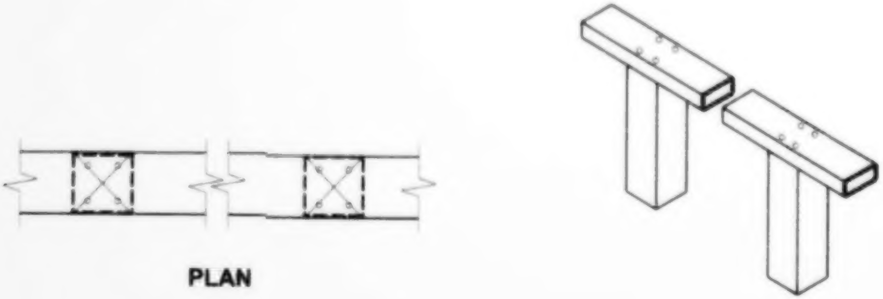
Connection Detail	Detail Number	Description
Top and/or Bottom Rail to Post	IA-1	Rail glued and screwed to post
Post to Floor	IB-1	Notched post glued and bolted to rim joist
Infill Picket	IC-1	Picket set into rails
	IC-2	Picket dowelled into rails
Stud Wall	ID-1	Wood stud and gypsum board
Column 1	2	3

Table 3.2.2.
Interior Cantilevered Picket System Connection Details

Connection Detail	Detail Number	Description
Picket to Floor	IE-1	Picket screwed to rim joist
Column 1	2	3

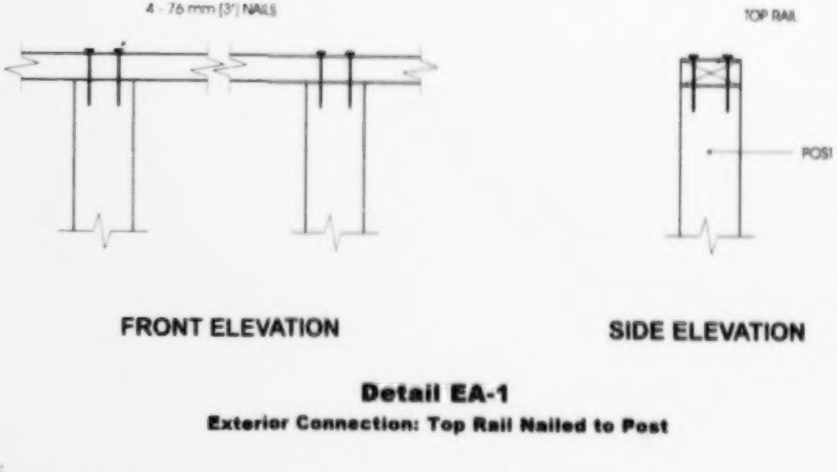
Table 3.2.3.
Interior Stair Guard Connection Details

Connection Detail	Detail Number	Description
Rail to Post	IF-1	Top or bottom rail glued and screwed to post
Post to Floor and/or Picket Volute to Floor	IG-1	Notched post glued and screwed to stringer and riser
	IG-2	Post glued and screwed to stringer
	IG-3	Post glued and screwed to stringer and stud wall
	IG-4	Post and picket volute, oak or maple
	IG-5	Picket volute, 260 mm (10¼") wide
	IG-6	Picket volute, 240 mm (9½") wide
Infill Picket	Detail IC-1 or IC-2 in Table 3.2.1., modified to suit a sloping installation, may be used.	
Cantilevered Picket	IH-1	Picket screwed to stair stringer
Column 1	2	3



PLAN

AXONOMETRIC



FRONT ELEVATION

SIDE ELEVATION

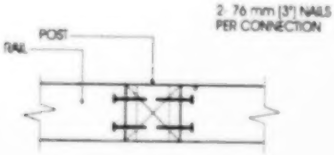
Detail EA-1

Exterior Connection: Top Rail Nailed to Post

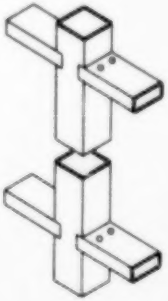
Notes:

1. The top rail must be continuous. Use Detail EA-5 at the end spans, where continuity ends.

MAXIMUM SPAN OF RAIL BETWEEN POSTS	
Species	Maximum Span, m (ft-in)
Douglas Fir-Larch, Hem-Fir, Spruce-Pine-Fir	1.52 (5'-0")
Northern Species	1.52 (5'-0")
Column 1	2


2- 76 mm [3"] NAILS
PER CONNECTION
POST
RAIL

PLAN



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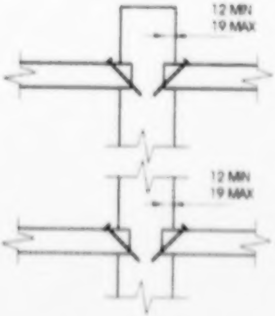
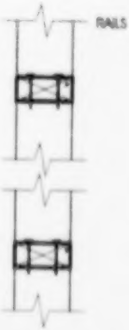

12 MIN
19 MAX
12 MIN
19 MAX

FRONT ELEVATION



SIDE ELEVATION

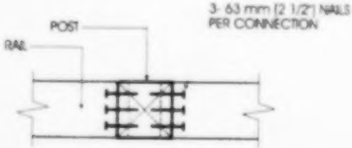
Detail EA-2

Exterior Connection: Top/Bottom Rail Skew Nailed to Post - 76 mm (3") Nails

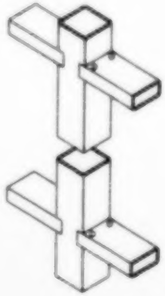
Notes:

1. The maximum span is more often governed by post spacing.
2. Provide support to bottom rail at intervals not more than 2.0 m (6'-7").
3. The bottom rail may be bevelled as detailed in Figure 2.1.2.
4. Dimensions shown are in mm unless otherwise specified.

MAXIMUM SPAN OF RAIL BETWEEN POSTS	
Species	Maximum Span, m (ft-in)
Douglas Fir-Larch, Hem-Fir, Spruce-Pine-Fir	2.72 (8'-11")
Northern Species	2.18 (7'-2")
Column 1	2


3- 63 mm [2 1/2"] NAILS
PER CONNECTION
POST
RAIL

PLAN



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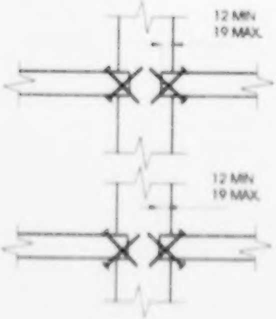
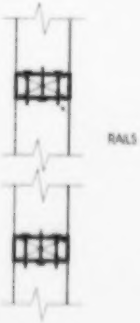

12 MIN
19 MAX.
12 MIN
19 MAX.

FRONT ELEVATION



SIDE ELEVATION

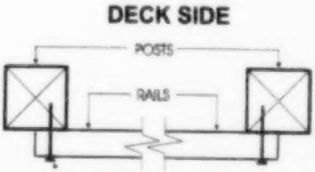
Detail EA-3

Exterior Connection: Top/Bottom Rail Skew Nailed to Post - 63 mm (2½") Nails

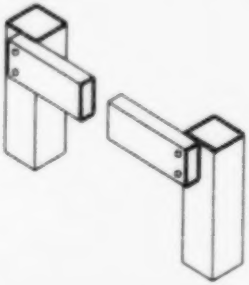
Notes:

1. Provide support to bottom rail at intervals not more than 2.0 m (6'-7").
2. The bottom rail may be bevelled as detailed in Figure 2.1.2.
3. Dimensions shown are in mm unless otherwise specified.

MAXIMUM SPAN OF RAIL BETWEEN POSTS	
Species	Maximum Span, m (ft-in)
Douglas Fir-Larch, Hem-Fir, Spruce-Pine-Fir	2.72 (8'-11")
Northern Species	2.18 (7'-2")
Column 1	2



PLAN



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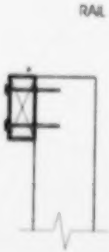
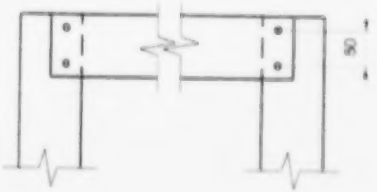




FRONT ELEVATION

SIDE ELEVATION

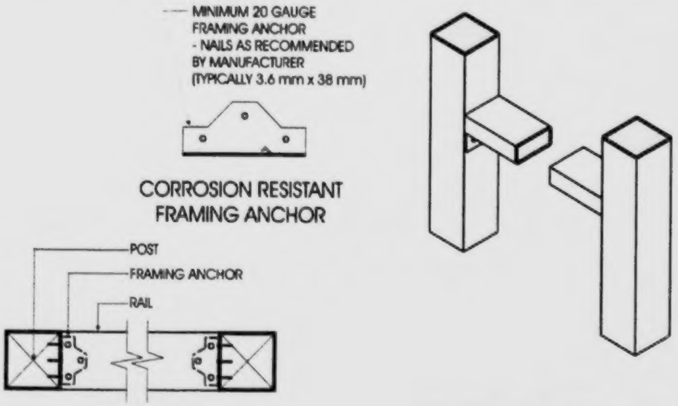
Detail EA-4

Exterior Connection: Top/Bottom Rail Face Nailed or Screwed to Post

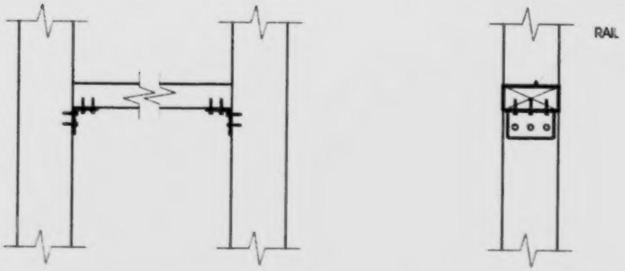
Notes:

1. If the rails are located on the deck side of the posts, 76 mm (3") nails may be used in place of the screws.
2. Where the top rail is continuous, the top rail may be fastened to each post with 3 - #8 x 76 mm (3") screws.
3. Dimensions shown are in mm unless otherwise specified.

MAXIMUM SPAN OF RAIL BETWEEN POSTS	
Species	Maximum Span, m (ft-in)
Douglas Fir-Larch, Hem-Fir, Spruce-Pine-Fir	1.77 (5'-10")
Northern Species	1.41 (4'-8")
Column 1	2


MINIMUM 20 GAUGE FRAMING ANCHOR
- NAILS AS RECOMMENDED BY MANUFACTURER (TYPICALLY 3.6 mm x 38 mm)
CORROSION RESISTANT FRAMING ANCHOR
POST
FRAMING ANCHOR
RAIL

PLAN **AXONOMETRIC**



FRONT ELEVATION **SIDE ELEVATION**

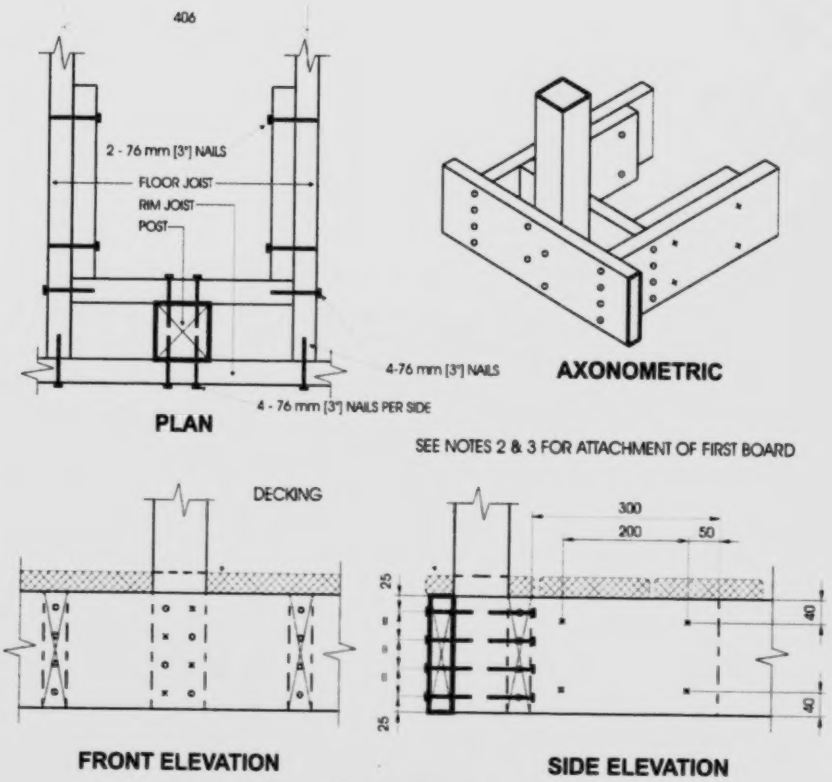
Detail EA-5

Exterior Connection: Top/Bottom Rail Fastened to Post with Framing Anchors

Notes:

1 Provide support to bottom rail at intervals not more than 2.0 m (6'-7").
2 The bottom rail may be bevelled as detailed in Figure 2.1.2.
3 Dimensions shown are in mm unless otherwise specified.

MAXIMUM SPAN OF RAIL BETWEEN POSTS	
Species	Maximum Span m (ft-in)
Douglas Fir-Larch, Hem-Fir, Spruce-Pine-Fir	2.72 (8'-11")
Northern Species	2.18 (7'-2")
Column 1	2


406
2 - 76 mm [3"] NAILS
FLOOR JOIST
RIM JOIST
POST
4-76 mm [3"] NAILS
4 - 76 mm [3"] NAILS PER SIDE
PLAN
AXONOMETRIC
DECKING
300
200
50
25
40
40
25
FRONT ELEVATION
SIDE ELEVATION

SEE NOTES 2 & 3 FOR ATTACHMENT OF FIRST BOARD

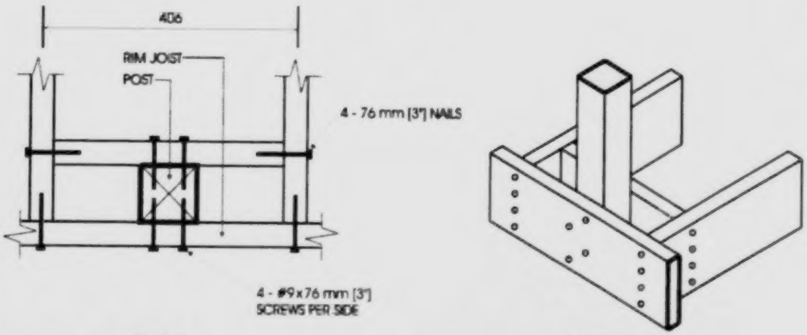
Detail EB-1

Exterior Connection: Post Nailed to Rim Joist

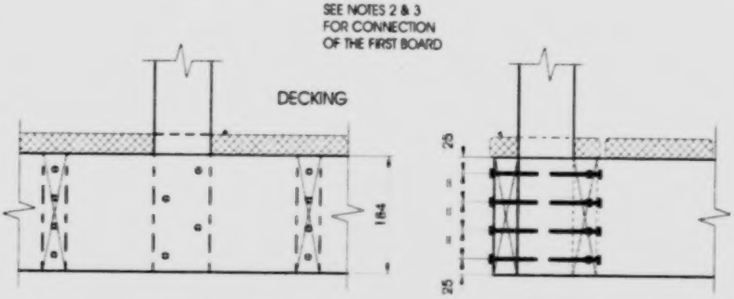
Notes:

1. Decking is omitted from the plan view and the axonometric view for clarity.
2. Fasten 25 mm x 140 mm ($^{5}/_{4}$" x 6" nominal) outer deck board to rim joist with 63 mm (2½") nails at 300 mm (12").
3. Fasten 25 mm x 140 mm ($^{5}/_{4}$" x 6" nominal) outer deck board to floor joist with 1 - 63 mm (2½") nail at each joist.
4. The post may be positioned anywhere between the joists.
5. Dimensions shown are in mm unless otherwise specified.

MAXIMUM SPACING BETWEEN POSTS	
Species	Maximum Spacing, m (ft-in)
Douglas Fir-Larch, Hem-Fir, Spruce-Pine-Fir	1.22 (4'-0")
Northern Species	1.20 (3'-11")
Column 1	2


406
RIM JOIST
POST
4 - 76 mm [3"] NAILS
4 - #9x76 mm [3"] SCREWS PER SIDE

PLAN **AXONOMETRIC**


SEE NOTES 2 & 3 FOR CONNECTION OF THE FIRST BOARD
DECKING
184
25
25

FRONT ELEVATION **SIDE ELEVATION**

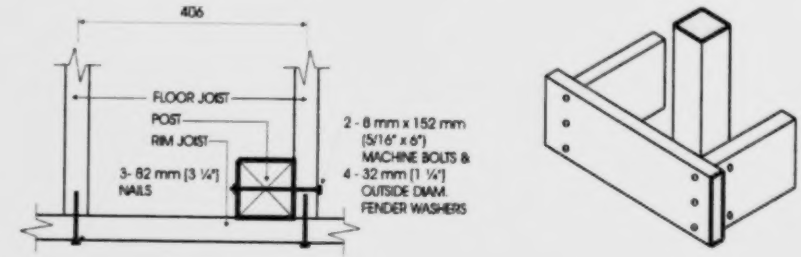
Detail EB-2

Exterior Connection: Post Screwed to Rim Joist

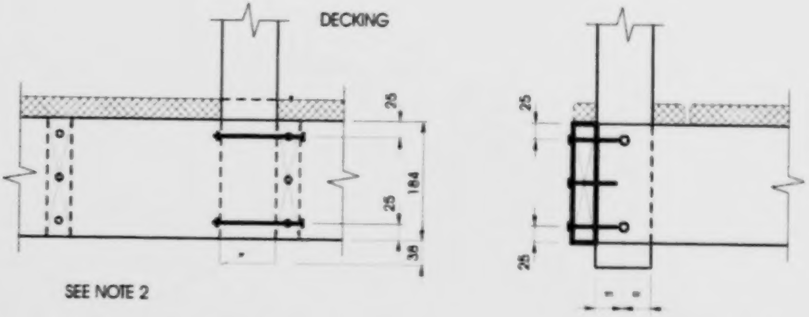
Notes:

1 Decking is omitted from the plan view and the axonometric view for clarity.
2 Fasten 25 mm x 140 mm (5/4" x 6" nominal) outer deck board to rim joist with 63 mm (2½") nails at 300 mm (12").
3 Fasten 25 mm x 140 mm (5/4" x 6" nominal) outer deck board to floor joist with 1 - 63 mm (2½") nail at each joist.
4 The post may be positioned anywhere between the joists.
5 #9 screws may be replaced by #8 screws if the maximum spacing between posts is not more than 1.20 m (3'-11").
6 Dimensions shown are in mm unless otherwise specified.

MAXIMUM SPACING BETWEEN POSTS	
Species	Maximum Spacing, m (ft-in)
Douglas Fir-Larch, Hem-Fir, Spruce-Pine-Fir	1.56 (5'-1")
Northern Species	1.20 (3'-11")
Column 1	2


406
FLOOR JOIST
POST
RIM JOIST
3- 82 mm [3 ¼"] NAILS
2 - 8 mm x 152 mm (5/16" x 6") MACHINE BOLTS & 4 - 32 mm [1 ¼"] OUTSIDE DIAM. FENDER WASHERS

PLAN **AXONOMETRIC**


DECKING
25
25
184
38
25
25
SEE NOTE 2

FRONT ELEVATION **SIDE ELEVATION**

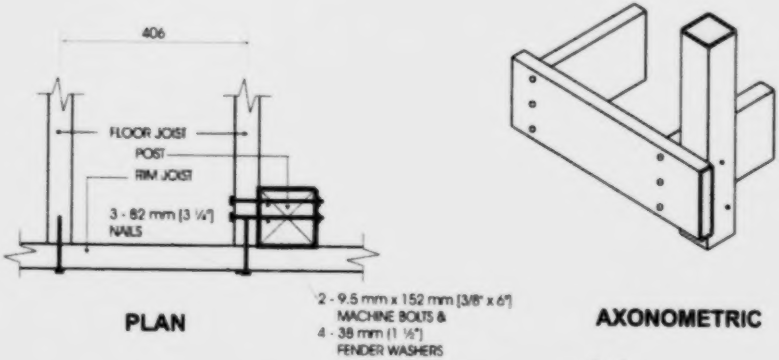
Detail EB-3

Exterior Connection: Post Bolted to Floor Joist - 8 mm (5/16") Bolts

Notes:

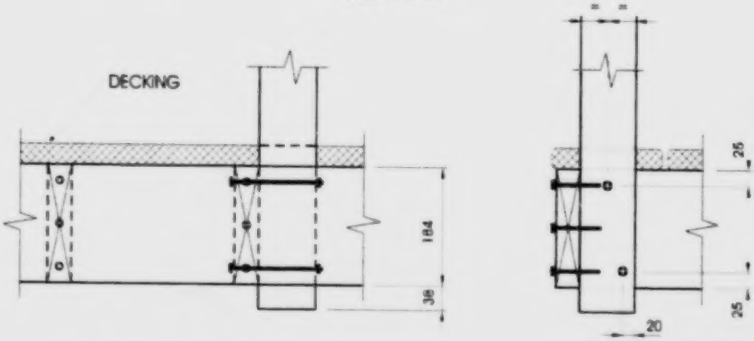
1. Decking is omitted from the plan view and the axonometric view for clarity.
2. 38 mm (1½") post projection is not required where the maximum spacing between posts does not exceed 1.20 m (3'-11").
3. Joists may be spaced at 610 mm (24") o.c. or 406 mm (16") o.c.
4. Where floor joists are spaced at 610 mm (24") o.c., decking shall have a minimum thickness of 38 mm (1½") and shall be fastened to the floor with 2 - 76 mm (3") nails.
5. Dimensions shown are in mm unless otherwise specified.

MAXIMUM SPACING BETWEEN POSTS	
Species	Maximum Spacing, m (ft-in)
Douglas Fir-Larch, Hem-Fir, Spruce-Pine-Fir	1.29 (4'-3")
Northern Species	1.20 (3'-11")
Column 1	2


406
FLOOR JOIST
POST
RIM JOIST
3 - 82 mm [3 ¼"] NAILS
2 - 9.5 mm x 152 mm [3/8" x 6"] MACHINE BOLTS &
4 - 38 mm (1 ½") FENDER WASHERS

PLAN

AXONOMETRIC


DECKING
184
38
25
25
20

FRONT ELEVATION

SIDE ELEVATION

Detail EB-4

Exterior Connection: Post Bolted to Floor Joist - 9.5 mm (3/8") Bolts

Notes:

1 Decking is omitted from the plan view and the axonometric view for clarity.

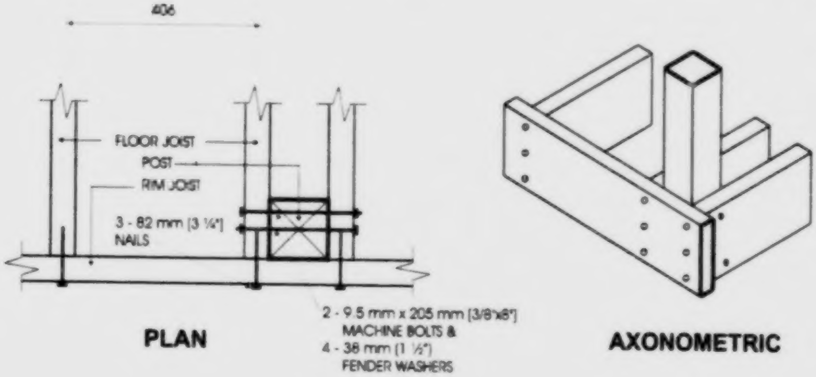
2 38 mm (1½") post projection is not required where the maximum spacing between posts does not exceed 1.20 m (3'-11").

3 Joists may be spaced at 610 mm (24") o.c. or 406 mm (16") o.c.

4 Where floor joists are spaced at 610 mm (24") o.c., decking shall have a minimum thickness of 38 mm (1½") and shall be fastened to the floor with 2 - 76 mm (3") nails.

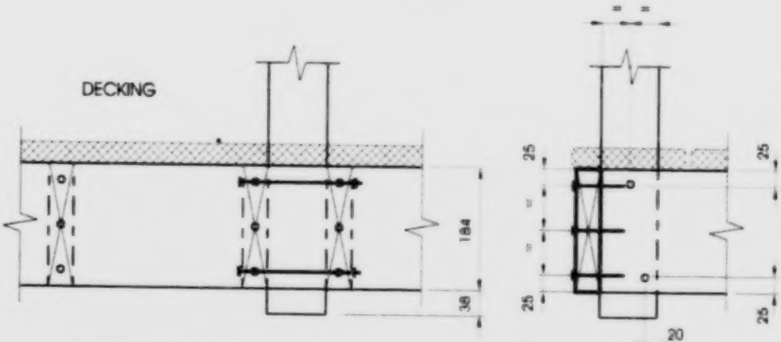
5 Dimensions shown are in mm unless otherwise specified.

MAXIMUM SPACING BETWEEN POSTS	
Species	Maximum Spacing, m (ft-in)
Douglas Fir-Larch, Hem-Fir, Spruce-Pine-Fir	1.49 (4'-11")
Northern Species	1.20 (3'-11")
Column 1	2


406
FLOOR JOIST
POST
RIM JOIST
3 - 82 mm [3 ¼"] NAILS
2 - 9.5 mm x 205 mm [3/8"x8"] MACHINE BOLTS &
4 - 38 mm [1 ½"] FENDER WASHERS

PLAN

AXONOMETRIC


DECKING
184
38
25
=
=
25
25
25
20

FRONT ELEVATION

SIDE ELEVATION

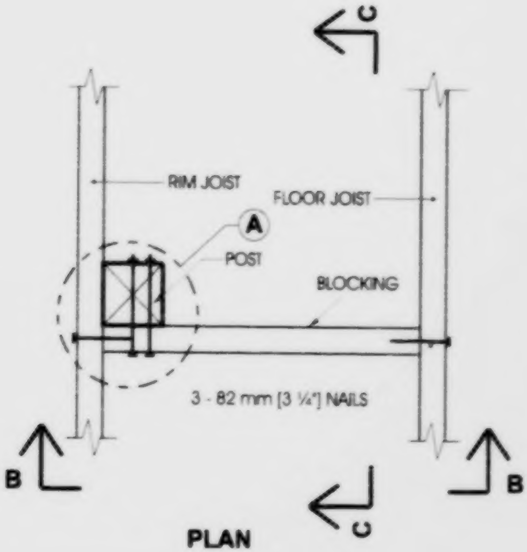
Detail EB-5

Exterior Connection: Post Bolted to 2 Floor Joists

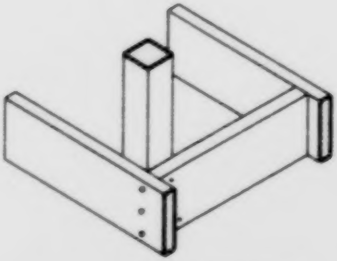
Notes:

1. Decking is omitted from the plan view and the axonometric view for clarity.
2. 38 mm (1½") post projection is not required where the maximum spacing between posts does not exceed 1.20 m (3'-11").
3. Joists may be spaced at 610 mm (24") o.c. or 406 mm (16") o.c.
4. Where floor joists are spaced at 610 mm (24") o.c. decking shall have a minimum thickness of 38 mm (1½") and shall be fastened to the floor with 2 - 76 mm (3") nails.
5. Dimensions shown are in mm unless otherwise specified.

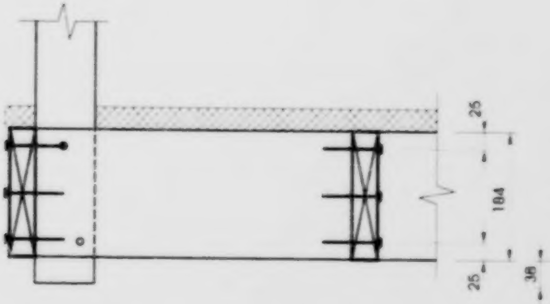
MAXIMUM SPACING BETWEEN POSTS	
Species	Maximum Spacing, m (ft-in)
Douglas Fir-Larch, Hem-Fir, Spruce-Pine-Fir	2.14 (7'-0")
Northern Species	1.20 (3'-11")
Column 1	2


C
RIM JOIST
FLOOR JOIST
A
POST
BLOCKING
3 - 82 mm [3 ¼"] NAILS
B
B
C

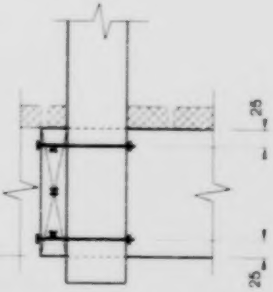
PLAN



AXONOMETRIC



ELEVATION B-B



ELEVATION C-C

Detail EB-6

Exterior Connection: Post Fastened to Floor, Guard Parallel to Floor Joists

Notes:

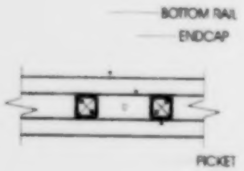
1 Use any of the connection details shown on Details EB-1 to EB-5 at location "A". Connection Detail EB-4 is shown in this detail as an example.

2 Maximum spacing between posts is determined from connection detail used at location "A".

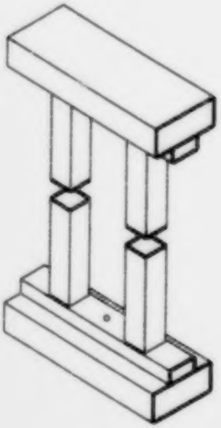
3 Decking is omitted from the plan view and the axonometric view for clarity.

4 Blocking shall be not less than 38 mm x 184 mm (2" x 8" nominal).

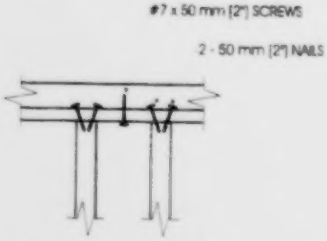
5. Dimensions shown are in mm unless otherwise specified


BOTTOM RAIL
ENDCAP
PICKET

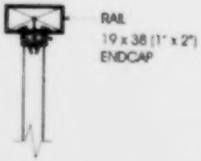
PLAN
BOTTOM RAIL



AXONOMETRIC


#7 x 50 mm [2"] SCREWS
2 - 50 mm [2"] NAILS

FRONT ELEVATION


RAIL
19 x 38 [1" x 2"]
ENDCAP

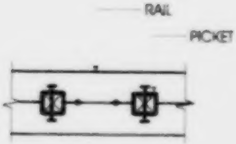
SIDE ELEVATION

Detail EC-1

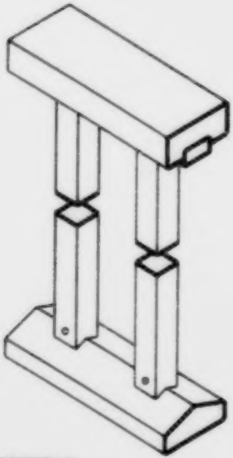
Exterior Connection: Infill Picket Nailed to Endcap - Endcap Screwed to Rail

Notes:

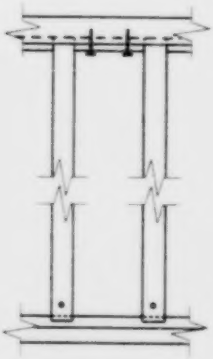
1. Fasten each end of each picket to endcaps with 2 - 50 mm (2") nails
2. Fasten endcaps to rails with #7 x 50 mm (2") screws at 300 mm (12") o.c.
3. See Table 2.1.2. for minimum sizes of pickets


RAIL
PICKET

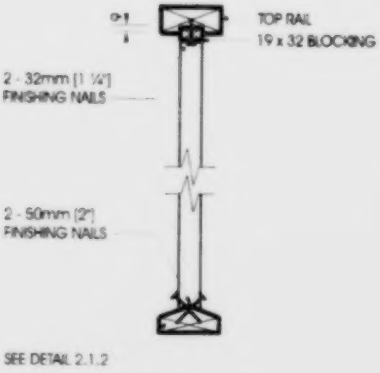
PLAN BOTTOM RAIL



AXONOMETRIC



FRONT ELEVATION


TOP RAIL
19 x 32 BLOCKING
2 - 32mm [1 ¼"] FINISHING NAILS
2 - 50mm [2"] FINISHING NAILS
SEE DETAIL 2.1.2

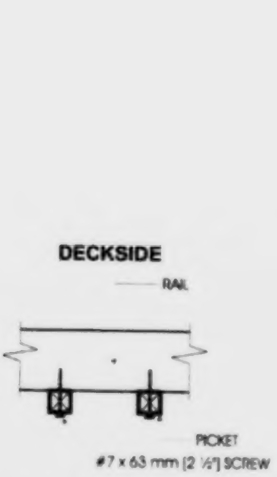
SIDE ELEVATION

Detail EC-2

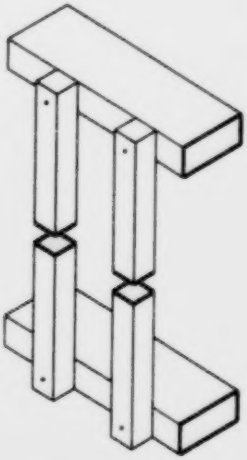
Exterior Connection: Infill Picket Nailed to Rail

Notes:

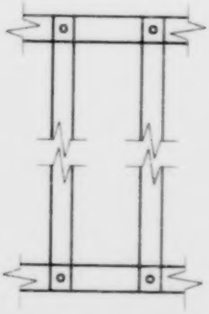
1. See Table 2.1.2. for minimum sizes of pickets.
2. Dimensions shown are in mm unless otherwise specified.


DECKSIDE
RAIL
PICKET
#7 x 63 mm [2 ½"] SCREW

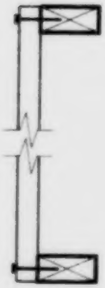
PLAN



AXONOMETRIC



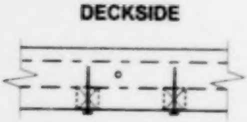
FRONT ELEVATION



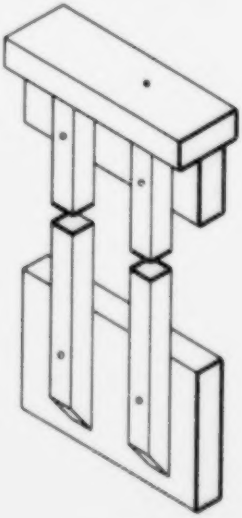
SIDE ELEVATION

Detail EC-3

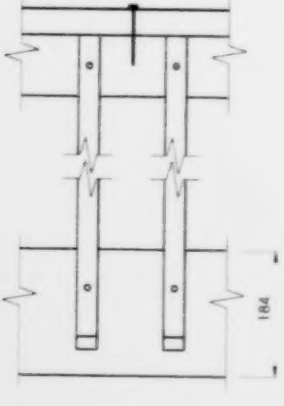
Exterior Connection: Infill Picket Screwed to Rail



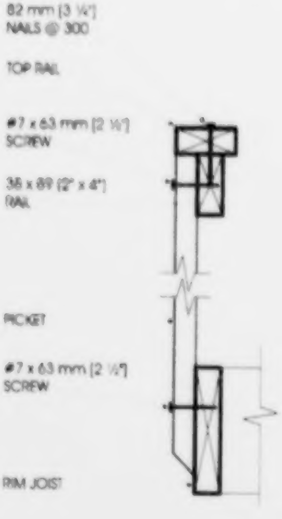
PLAN



AXONOMETRIC



FRONT ELEVATION


82 mm [3 ¼"]
NAILS @ 300
TOP RAIL
#7 x 63 mm [2 ½"]
SCREW
38 x 89 [2" x 4"]
RAIL
PICKET
#7 x 63 mm [2 ½"]
SCREW
RIM JOIST

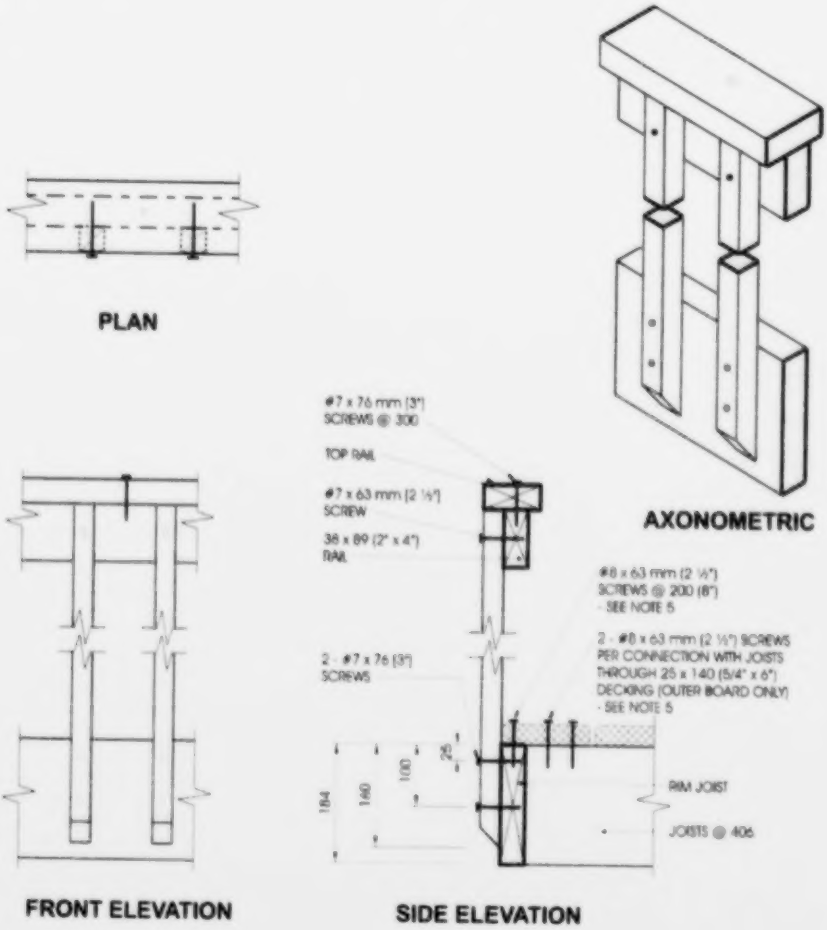
SIDE ELEVATION

Detail EC-4

Exterior Connection: Infill Picket Screwed to Top Rail and Rim Joist

Note:

1 Dimensions shown are in mm unless otherwise specified.

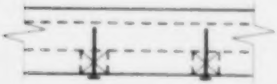

PLAN
AXONOMETRIC
FRONT ELEVATION
SIDE ELEVATION
#7 x 76 mm (3") SCREWS @ 300
TOP RAIL
#7 x 63 mm (2 ½") SCREW
38 x 89 (2" x 4") RAIL
#8 x 63 mm (2 ½") SCREWS @ 200 (8") - SEE NOTE 5
2 - #8 x 63 mm (2 ½") SCREWS PER CONNECTION WITH JOISTS THROUGH 25 x 140 (5/4" x 6") DECKING (OUTER BOARD ONLY) - SEE NOTE 5
2 - #7 x 76 (3") SCREWS
184
140
100
25
RIM JOIST
JOISTS @ 406

Detail ED-1

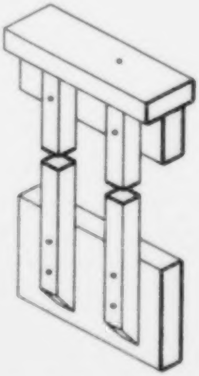
Exterior Connection: Cantilevered Picket Screwed to Rim Joist

Notes:

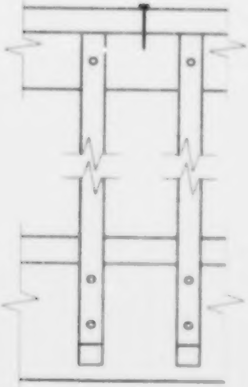
1. Provide a suitable post, return, or solid support at each end of the guard.
2. Wood for cantilevered pickets shall be Douglas Fir-Larch, Spruce-Pine-Fir, or Hem-Fir Species.
3. Fasten rim joist to each floor joist with 3 - 82 mm (3¼") nails.
4. Dimensions shown are in mm unless otherwise specified.
5. The outer deck board shall not be less than 140 mm (6" nominal) wide. Where 38 mm (2" nominal) thick boards are used, the length of the wood screws shall be not less than 76 mm (3").



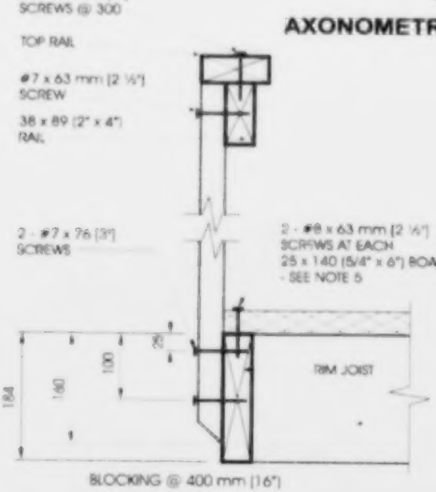
PLAN



AXONOMETRIC



FRONT ELEVATION


ø7 x 76 mm [3"]
SCREWS @ 300
TOP RAIL
ø7 x 63 mm [2 ½"]
SCREW
38 x 89 [2" x 4"]
RAIL
2 - ø7 x 76 [3"]
SCREWS
2 - ø8 x 63 mm [2 ½"]
SCREWS AT EACH
25 x 140 [5/4" x 6"] BOARD
- SEE NOTE 5
20
100
140
184
RIM JOIST
BLOCKING @ 400 mm [16"]

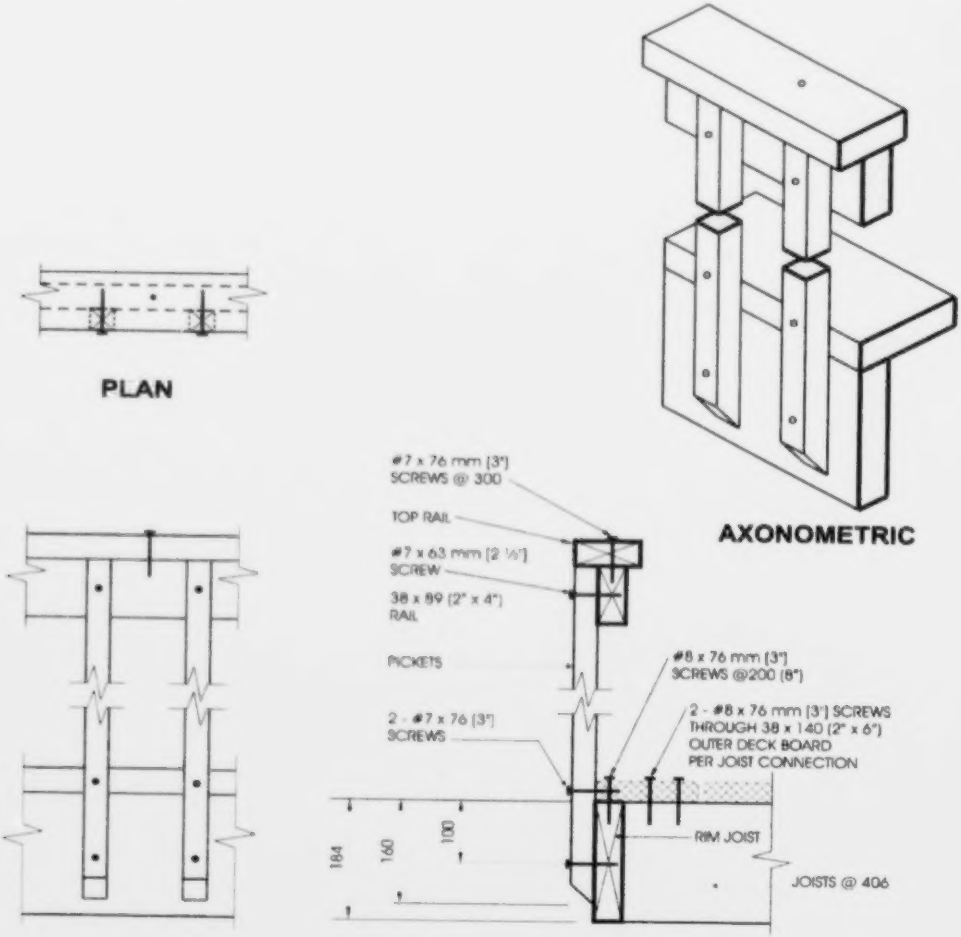
SIDE ELEVATION

Detail ED-2

Exterior Connection: Cantilevered Picket Screwed to Rim Joist, Guard Parallel to Floor Joists

Notes:

1. Provide a suitable post, return, or solid support at each end of the guard.
2. Wood for cantilevered pickets shall be Douglas Fir-Larch, Spruce-Pine-Fir, or Hem-Fir Species.
3. Fasten rim joist to blocking with 3 - 82 mm (3¼") nails.
4. Dimensions shown are in mm unless otherwise specified.
5. Where 38 mm (2" nominal) thick boards are used, the length of the wood screws shall be not less than 76 mm (3").


PLAN
AXONOMETRIC
#7 x 76 mm (3") SCREWS @ 300
TOP RAIL
#7 x 63 mm (2 ½") SCREW
38 x 89 (2" x 4") RAIL
PICKETS
2 - #7 x 76 (3") SCREWS
#8 x 76 mm (3") SCREWS @200 (8")
2 - #8 x 76 mm (3") SCREWS THROUGH 38 x 140 (2" x 6") OUTER DECK BOARD PER JOIST CONNECTION
RIM JOIST
JOISTS @ 406
184
160
100

FRONT ELEVATION

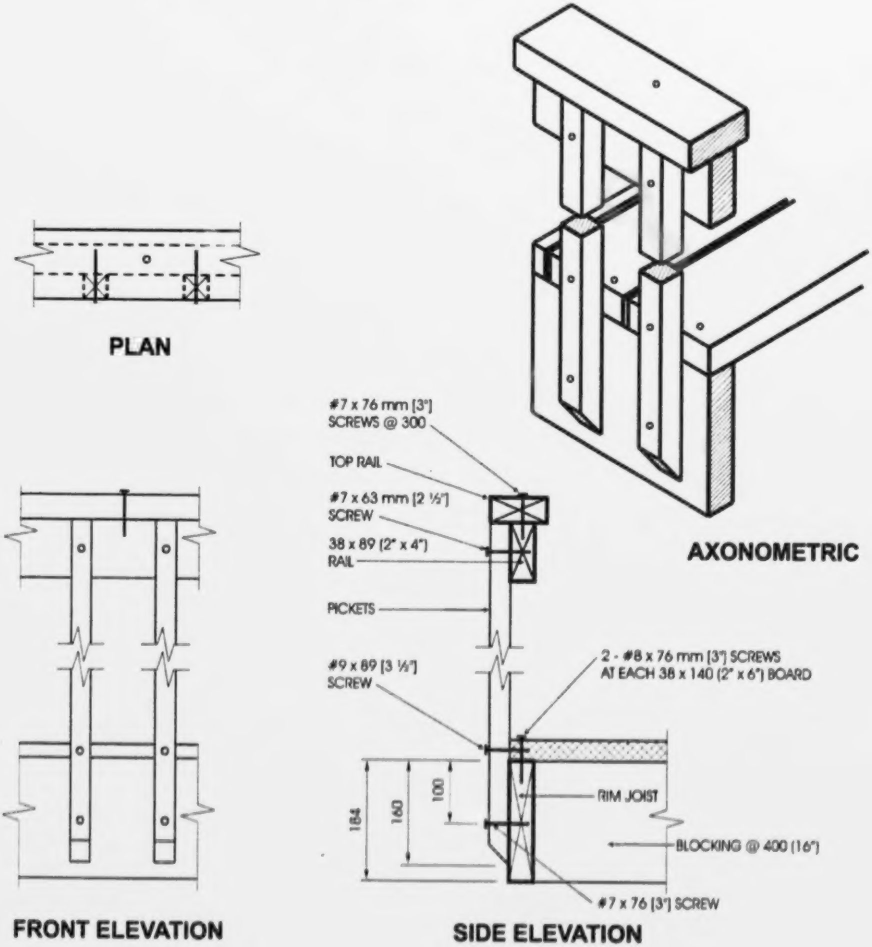
SIDE ELEVATION

Detail ED-3

Exterior Connection: Cantilevered Picket Screwed to Rim Joist and Deck

Notes:

1. Provide a suitable post, return, or solid support at each end of the guard.
2. Wood for cantilevered pickets shall be Northern Species.
3. Fasten rim joist to each floor joist with 3 - 82 mm (3¼") nails.
4. Dimensions shown are in mm unless otherwise specified.

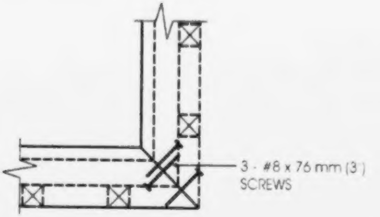

PLAN
AXONOMETRIC
#7 x 76 mm [3"] SCREWS @ 300
TOP RAIL
#7 x 63 mm [2 ½"] SCREW
38 x 89 [2" x 4"] RAIL
PICKETS
#9 x 89 [3 ½"] SCREW
2 - #8 x 76 mm [3"] SCREWS AT EACH 38 x 140 [2" x 6"] BOARD
RIM JOIST
BLOCKING @ 400 [16"]
#7 x 76 [3"] SCREW
164
160
100
FRONT ELEVATION
SIDE ELEVATION

Detail ED-4

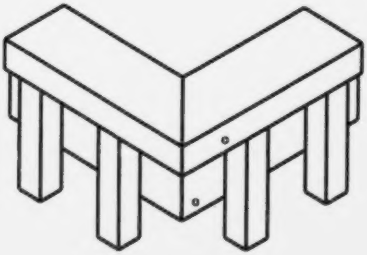
Exterior Connection: Cantilevered Picket Screwed to Rim Joist and Deck, Guard Parallel to Floor Joists

Notes:

1. Provide a suitable post, return, or solid support at each end of the guard.
2. Wood for cantilevered pickets shall be Northern Species.
3. Fasten rim joist to blocking with 3 - 82 mm (3¼") nails.
4. Dimensions shown are in mm unless otherwise specified.

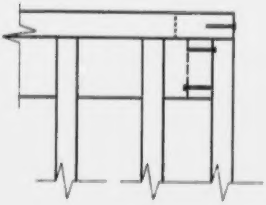


PLAN TOP RAIL

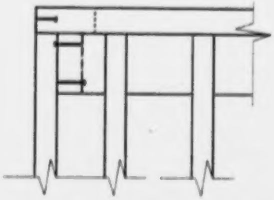


AXONOMETRIC

ONE FASTENER IN HORIZONTALLY ORIENTATED PORTION OF TOP RAIL AND TWO IN VERTICALLY ORIENTATED PORTION.



FRONT TOP RAIL



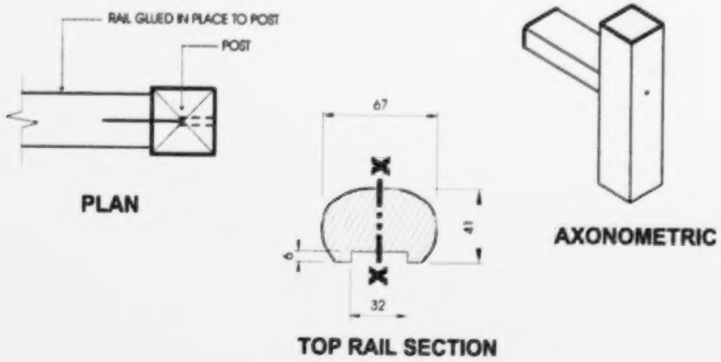
SIDE TOP RAIL

Detail ED-5

Exterior Connection: Corner Joint

Notes:

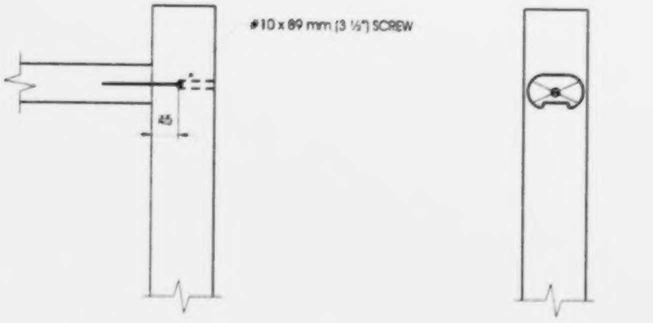
1. Screws fastening pickets are omitted for clarity.
2. Provide a minimum of 10 pickets beyond the return if end restraint of the guard is provided by this return detail only.



PLAN

TOP RAIL SECTION

AXONOMETRIC



FRONT ELEVATION

SIDE ELEVATION

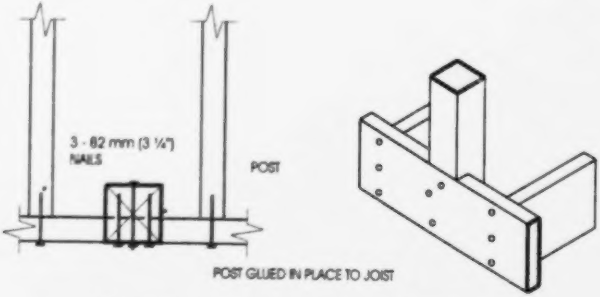
Detail IA-1

Interior Connection: Rail Glued and Screwed to Post

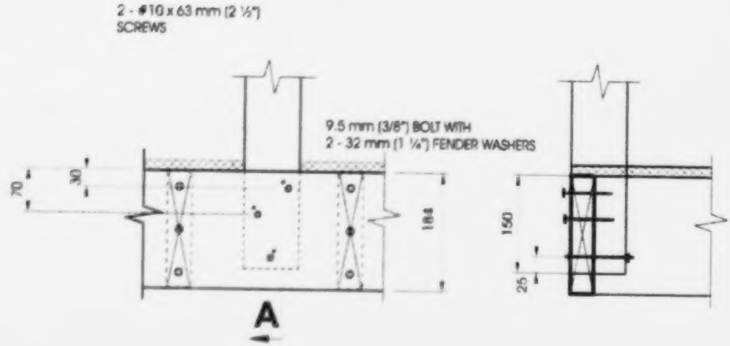
Notes:

1 Other top rail systems may be used provided the section modulus is not less than 24 000 mm^3 measured about the x-x axis.
2 Pickets omitted on drawing for clarity.
3 Connection details for fastening of pickets to rails are shown on Details IC-1 and IC-2.
4 Dimensions shown are in mm unless otherwise specified.

MAXIMUM SPAN OF RAIL BETWEEN POSTS	
Species	Maximum Span, m (ft-in)
Oak, Maple	3.30 (10'-10")
Column 1	2


3 - 82 mm (3 ¼") NAILS
POST
POST GLUED IN PLACE TO JOIST

PLAN **AXONOMETRIC**


2 - #10 x 63 mm (2 ½") SCREWS
9.5 mm (3/8") BOLT WITH
2 - 32 mm (1 ¼") FENDER WASHERS
70
30
184
150
25
A

FRONT ELEVATION **SECTION-A**

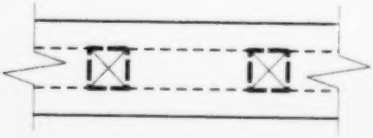
Detail IB-1

Interior Connection: Notched Post Glued and Bolted to Rim Joist

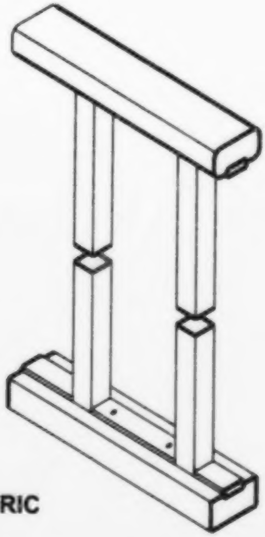
Notes:

1. Minimum dimension of post is 82 mm x 82 mm (3¼" x 3¼")
2. Notch post 38 mm x 152 mm (1½" x 6") at rim joist.
3. Dimensions shown are in mm unless otherwise specified

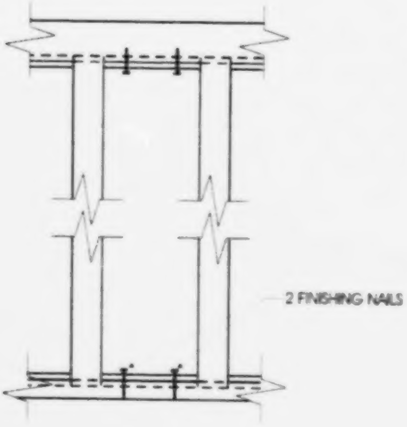
MAXIMUM SPACING BETWEEN POSTS	
Post Species	Maximum Spacing, m (ft-in)
Oak, Maple, Yellow Poplar, Hemlock, White Pine	3.30 (10'-10")
Column 1	2



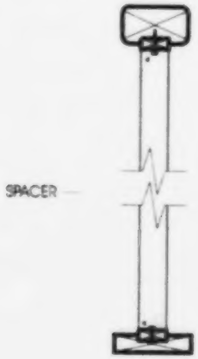
PLAN



AXONOMETRIC



FRONT ELEVATION



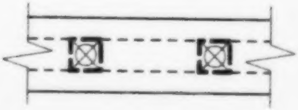
SIDE ELEVATION

Detail IC-1

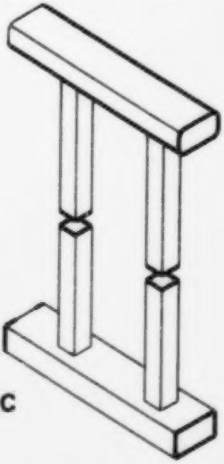
Interior Connection: Infill Picket Set Into Rails

Notes:

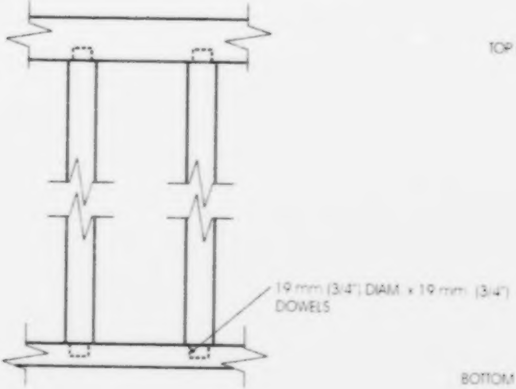
1. See Table 3.1.2. for minimum sizes of pickets.
2. For top and bottom rail provide 6 mm (¼") deep rabbet.



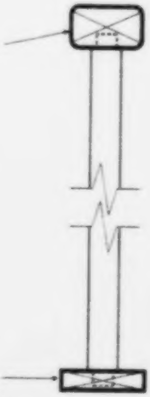
PLAN



AXONOMETRIC


19 mm (3/4") DIAM. x 19 mm (3/4")
DOWELS

FRONT ELEVATION


TOP RAIL
BOTTOM RAIL

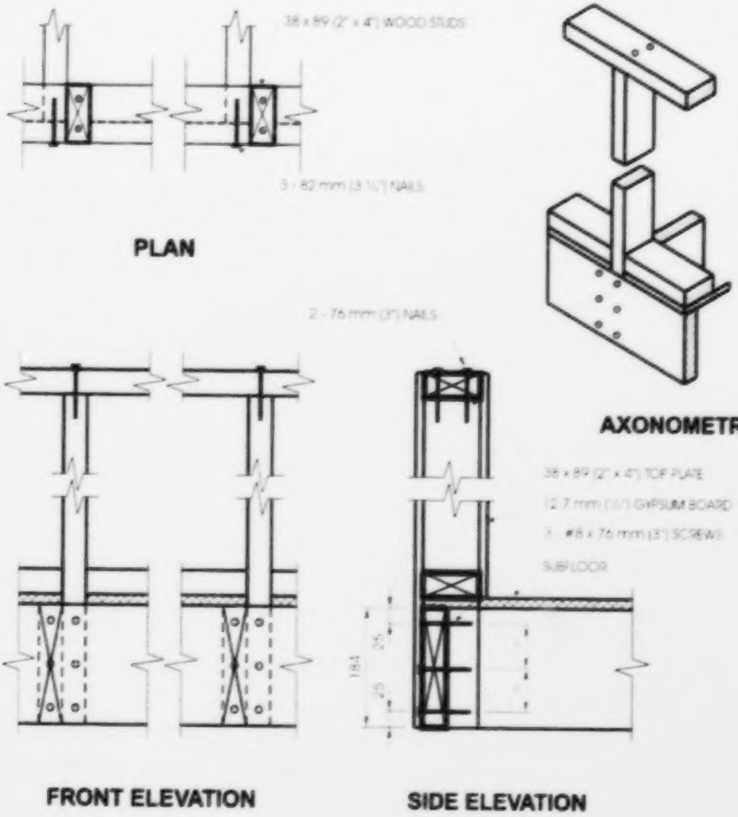
SIDE ELEVATION

Detail IC-2

Interior Connection: Infill Picket Dowelled into Rails

Notes:

1. See Table 3.1.2 for minimum sizes of pickets.
2. Pickets dowelled 19 mm (¾") deep into rails with 19 mm (¾") diameter dowels.


38 x 89 (2" x 4") WOOD STUDS
3 - 82 mm (3 ¼") NAILS
2 - 76 mm (3") NAILS
38 x 89 (2" x 4") TOP PLATE
12.7 mm (½") GYPSUM BOARD
3 - #8 x 76 mm (3") SCREWS
SUBFLOOR
184
25
25

PLAN

AXONOMETRIC

FRONT ELEVATION

SIDE ELEVATION

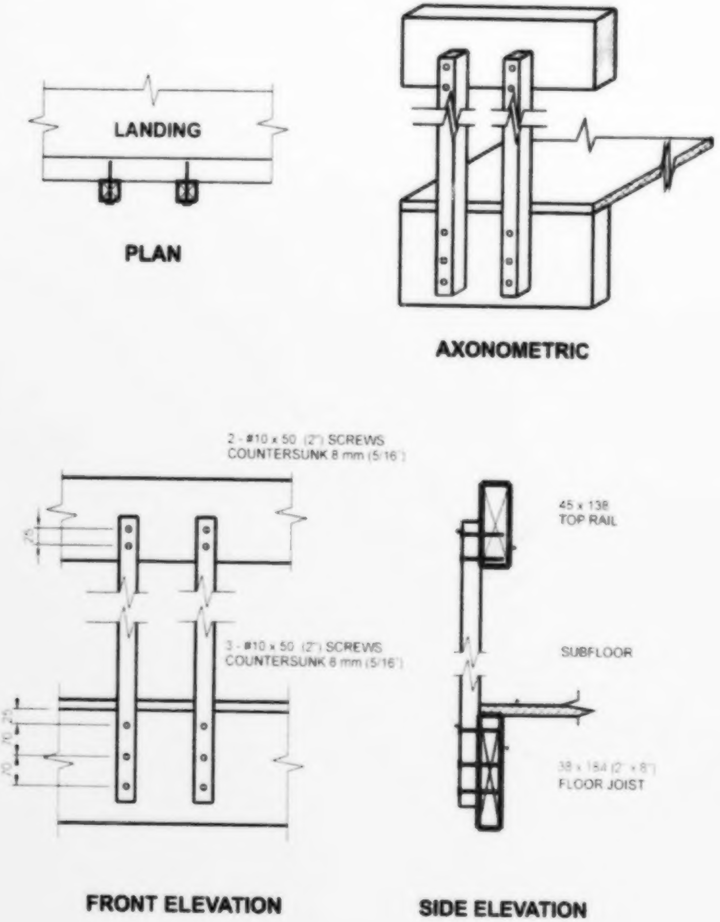
Detail ID-1

Interior Connection: Wood Stud and Gypsum Board Guard

Notes:

1. Fasten plywood subfloor to joists with 50 mm (2") nails at 150 mm (6") oc along edges and at 300 mm (12") oc along intermediate supports.
2. Gypsum board omitted on plan, front elevation, and axonometric for clarity.
3. Dimensions shown are in mm unless otherwise specified.
4. Provide a suitable post, return, or solid support at each end of the guard.

MAXIMUM SPACING BETWEEN WOOD STUDS	
Stud Species	Maximum Spacing, mm (in)
Douglas Fir-Larch, Hem-Fir, Spruce-Pine-Fir, Northern Species	406 (16")
Column 1	2

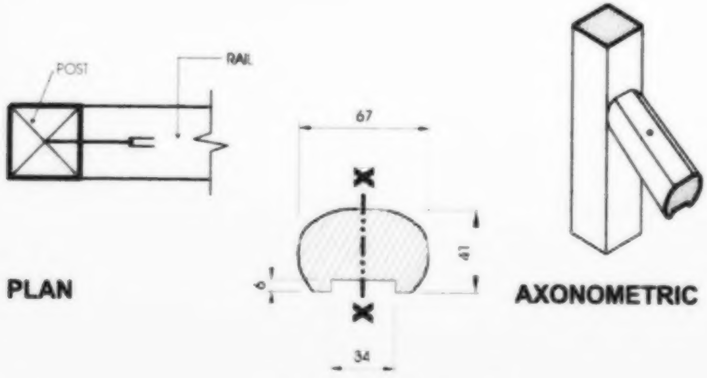

LANDING
PLAN
AXONOMETRIC
2 - #10 x 50 (2") SCREWS COUNTERSUNK 8 mm (5/16")
25
3 - #10 x 50 (2") SCREWS COUNTERSUNK 8 mm (5/16")
25
70
70
45 x 138 TOP RAIL
SUBFLOOR
38 x 184 (2" x 8") FLOOR JOIST
FRONT ELEVATION
SIDE ELEVATION

Detail IE-1

Interior Connection: Cantilevered Picket Screwed to Rim Joist

Notes:

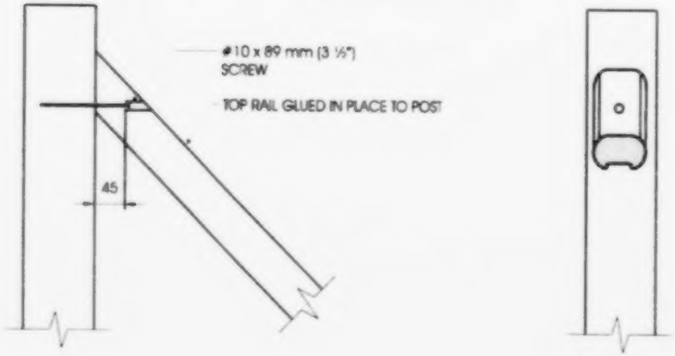
1. Provide a suitable post, return, or solid support at each end of the guard.
2. See Table 3.1.2. for minimum sizes of pickets.
3. Dimensions shown are in mm unless otherwise specified.
4. Rim joist and top rail of oak or maple.


POST
RAIL
67
X
41
6
X
34

PLAN

TOP RAIL SECTION

AXONOMETRIC


#10 x 89 mm (3 ½") SCREW
TOP RAIL GLUED IN PLACE TO POST
45

FRONT ELEVATION

SIDE ELEVATION

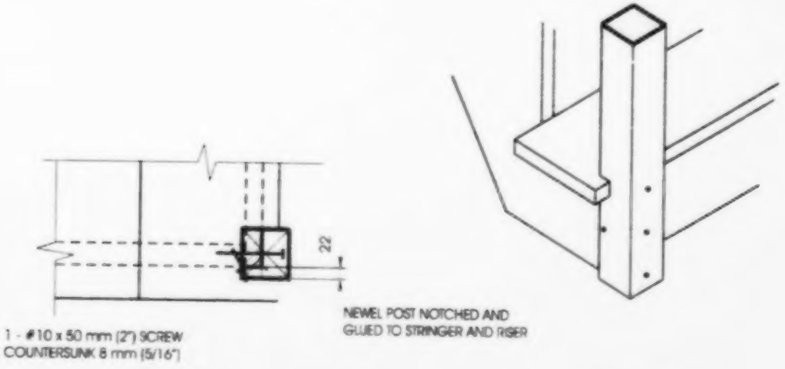
Detail IF-1

Interior Stair Guard Connection: Top/Bottom Rail Glued and Screwed to Post

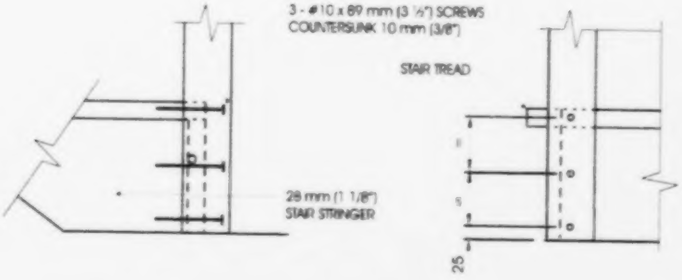
Notes:

1. Maximum permitted span is based on a slope between 35° and 45° from the horizontal
2. Minimum section modulus of top rail shall be 24 000 mm^3 measured about the x-x axis
3. Pickets omitted on drawing, for clarity
4. Detail IC-1 or Detail IC-2, modified to suit a sloping application may be used for picket to rail connections

MAXIMUM SPAN OF RAIL, MEASURED ALONG THE SLOPE	
Rail Species	Maximum Span, m (ft-in)
Oak, Maple	4.30 (14'-1")
Column 1	2


22
1 - #10 x 50 mm (2") SCREW
COUNTERSUNK 8 mm (5/16")
NEWEL POST NOTCHED AND
GLUED TO STRINGER AND RISER

PLAN **AXONOMETRIC**


3 - #10 x 89 mm (3 ½") SCREWS
COUNTERSUNK 10 mm (3/8")
STAIR TREAD
28 mm (1 1/8")
STAIR STRINGER
25

FRONT ELEVATION **SIDE ELEVATION**

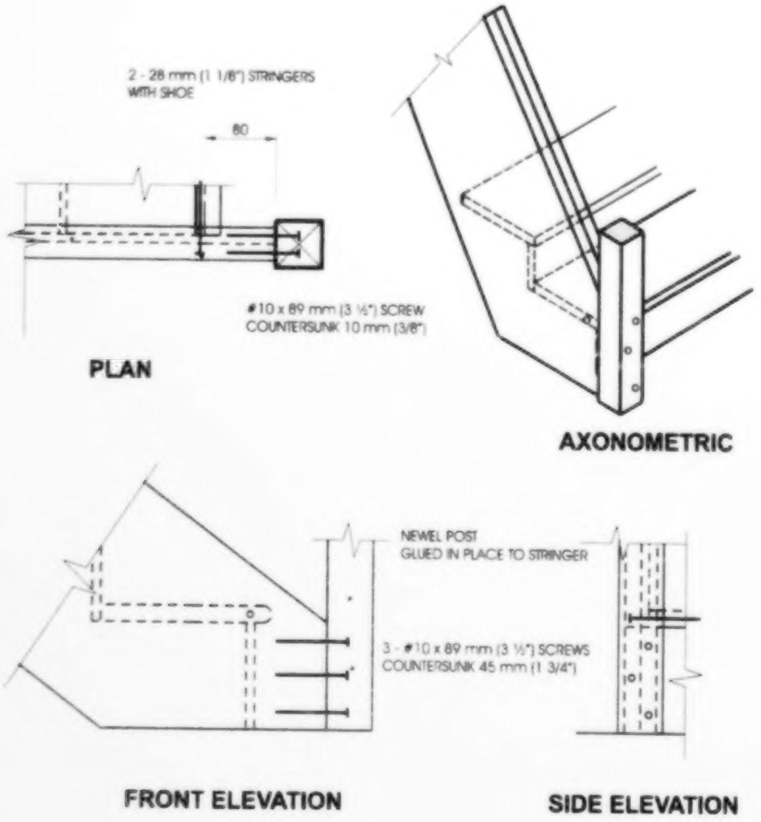
Detail IG-1

Interior Stair Guard Connection: Notched Post Glued & Screwed to Stringer & Riser

Notes:

1. Stringer shall be oak or maple
2. Notch post 38 mm x 60 mm (1½" x 2⅜") to fit over stair stringer
3. Only the first riser and tread are shown, for clarity
4. Minimum thickness of riser shall be 12 mm (½")
5. Detail IC-1 or Detail IC-2 modified to suit a sloping application may be used for picket to rail connections
6. Dimensions shown are in mm unless otherwise specified

MAXIMUM SPACING BETWEEN POSTS	
Post Species	Maximum Spacing, m (ft-in)
Oak, Maple, Yellow Poplar, Hemlock, White Pine	3.30 m (10'-10")
Column 1	2


2 - 28 mm (1 1/8") STRINGERS WITH SHOE
80
#10 x 89 mm (3 ½") SCREW COUNTERSUNK 10 mm (3/8")
NEWEL POST GLUED IN PLACE TO STRINGER
3 - #10 x 89 mm (3 ½") SCREWS COUNTERSUNK 45 mm (1 3/4")

PLAN

AXONOMETRIC

FRONT ELEVATION

SIDE ELEVATION

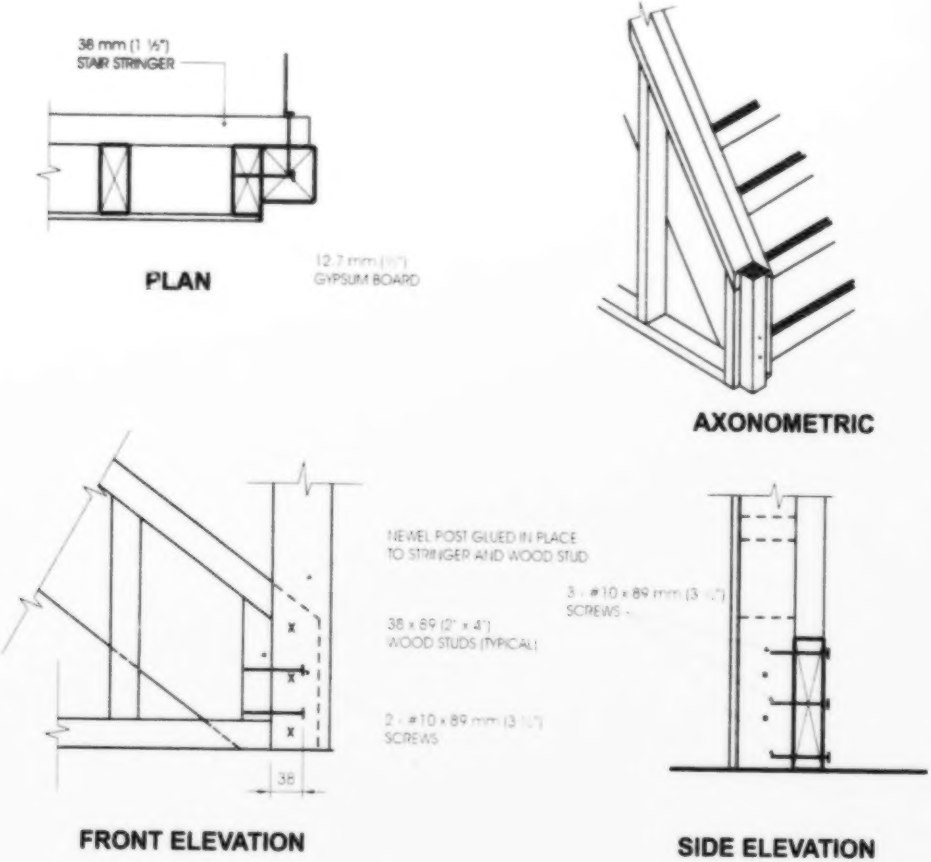
Detail IG-2

Interior Stair Guard Connection: Post Glued and Screwed to Stringer

Notes:

1 Stringer shall be oak or maple.
2 Only the first riser and tread are shown, for clarity.
3 Minimum thickness of riser shall be 12 mm (½").
4 Detail IC-1 or Detail IC-2, modified to suit a sloping application, may be used for picket to rail connections.
5 Dimensions shown are in mm unless otherwise specified.

MAXIMUM SPACING BETWEEN POSTS	
Post Species	Maximum Spacing, m (ft-in)
Oak, Maple, Yellow Poplar, Hemlock, White Pine	3.30 (10'-10")
Column 1	2


38 mm (1 ½")
STAIR STRINGER
PLAN
12.7 mm (½")
GYPSUM BOARD
AXONOMETRIC
NEWEL POST GLUED IN PLACE
TO STRINGER AND WOOD STUD
3 - #10 x 89 mm (3 ½")
SCREWS
38 x 89 (2" x 4")
WOOD STUDS (TYPICAL)
2 - #10 x 89 mm (3 ½")
SCREWS
38
FRONT ELEVATION
SIDE ELEVATION

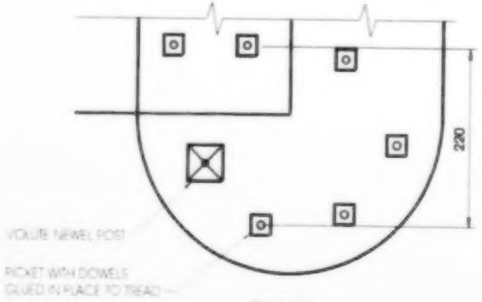
Detail IG-3

Interior Stair Guard Connection: Post Glued and Screwed to Stringer and Stud Wall

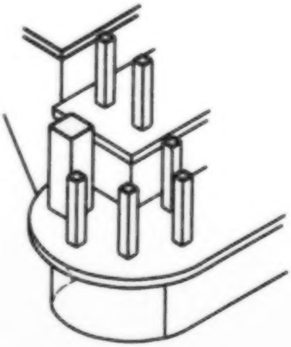
Notes:

1. Minimum thickness of riser shall be 12 mm (½")
2. Detail IC-1 or Detail IC-2 modified to suit a sloping application may be used for picket to rail connections
3. Dimensions shown are in mm unless otherwise specified

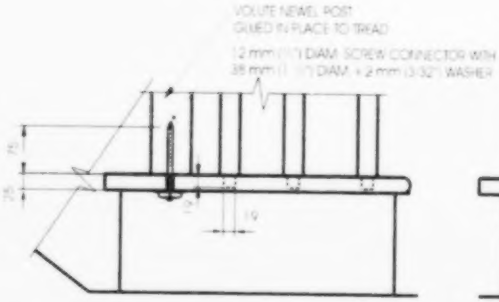
MAXIMUM SPACING BETWEEN POSTS	
Post Species	Maximum Spacing, m (ft-in)
Oak, Maple, Yellow Poplar, Hemlock, White Pine	3.30 m (10'-10")
Column 1	2


220
VOLUTE NEWEL POST
PICKET WITH DOWELS
GLUED IN PLACE TO TREAD

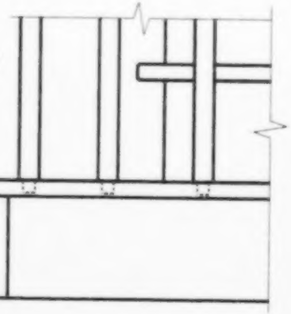
PLAN



AXONOMETRIC


VOLUTE NEWEL POST
GLUED IN PLACE TO TREAD
12 mm (½") DIAM. SCREW CONNECTOR WITH
38 mm (1 ½") DIAM. × 2 mm (3/32") WASHER
75
25
2
19

FRONT ELEVATION



SIDE ELEVATION

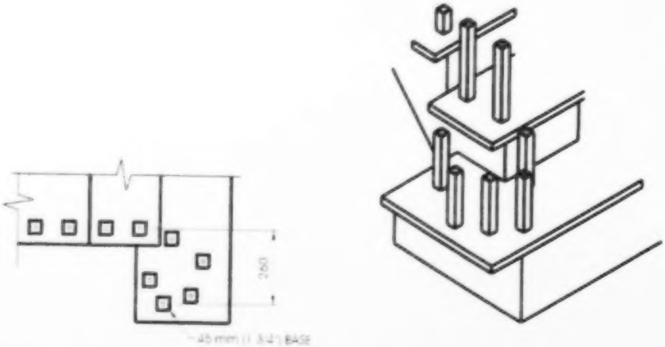
Detail IG-4

Interior Stair Guard Connection: Oak or Maple Post and Picket Volute

Notes:

1. Maximum permitted span is measured from the centre of the volute to a post or other solid support.
2. Other top rail systems may be used provided that the section modulus is not less than 24 000 mm^3, measured about the vertical axis.
3. Newel post and pickets in the volute shall be oak or maple. See Table 3.1.2. for minimum sizes of pickets.
4. Detail IC-1 or Detail IC-2, modified to suit a sloping application may be used for picket to rail connections.
5. Dimensions shown are in mm unless otherwise specified.

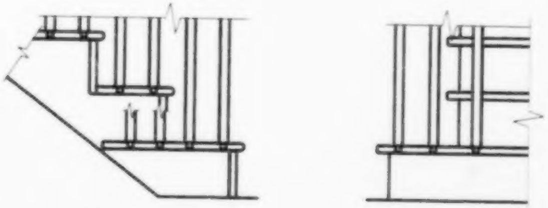
MAXIMUM SPAN OF RAIL MEASURED ALONG THE SLOPE	
Post and Picket Species	Maximum Span, m (ft-in)
Oak, Maple	4.30 m (14'-1")
Column 1	2



45 mm (1 3/4") BASE SQUARE PICKETS WITH 19 mm (3/4") DIAM. × 19 mm (3/4") DOWELS GLUED IN PLACE

PLAN

AXONOMETRIC



FRONT ELEVATION

SIDE ELEVATION

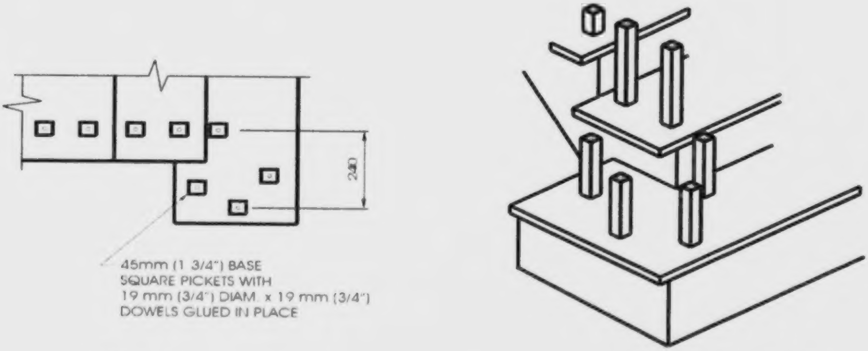
Detail IG-5

Interior Stair Guard Connection: Picket Volute, 260 mm (10¼") Wide

Notes:

1. Maximum permitted span is measured from the centre of the volute to a post or other solid support.
2. Other top rail systems may be used provided that the section modulus is not less than 24 000 mm^3, measured about the vertical axis.
3. See Table 3.1.2. for minimum sizes of pickets.
4. Detail IC-1 or Detail IC-2 modified to suit a sloping application may be used for picket to rail connections.
5. Dimensions shown are in mm unless otherwise specified.

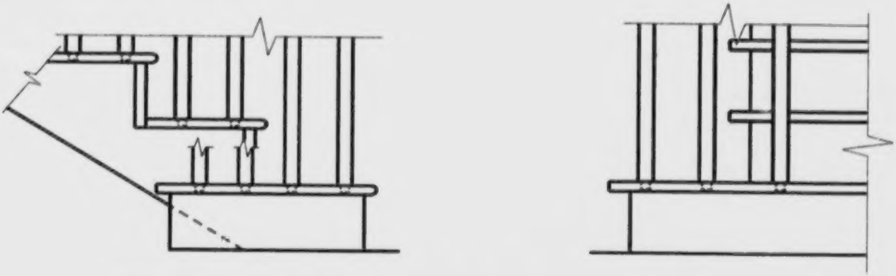
MAXIMUM SPAN OF RAIL	
Picket Species	Maximum Span, m (ft-in)
Yellow Poplar, Hemlock, White Pine	1.80 (5'-11)
Column 1	2



45mm (1 3/4") BASE
SQUARE PICKETS WITH
19 mm (3/4") DIAM. x 19 mm (3/4")
DOWELS GLUED IN PLACE

PLAN

AXONOMETRIC



FRONT ELEVATION

SIDE ELEVATION

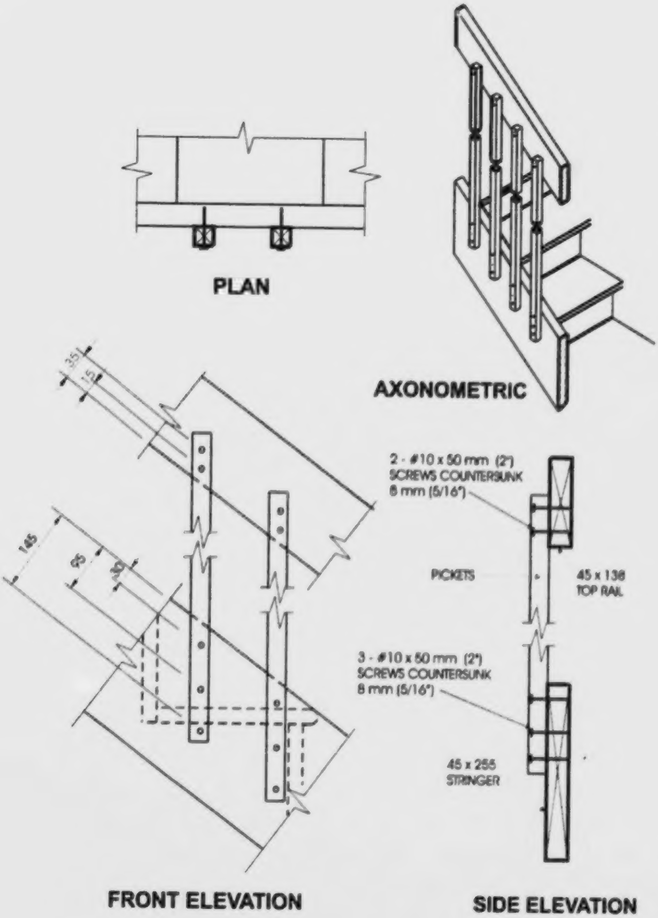
Detail IG-6

Interior Stair Guard Connection: Picket Volute, 240 mm (9½") Wide

Notes:

1. Maximum permitted span is measured from the centre of the volute to a post or other solid support.
2. Other top rail systems may be used provided that the section modulus is not less than 24,000 mm^3, measured about the vertical axis.
3. See Table 3.1.2. for minimum sizes of pickets.
4. Detail IC-1 or Detail IC-2, modified to suit a sloping application may be used for picket to rail connections.
5. Dimensions shown are in mm unless otherwise specified.

MAXIMUM SPAN OF RAIL	
Species	Maximum Span, m (ft-in)
Yellow Poplar, Hemlock, White Pine	1.80 (5'-11")
Column 1	2


PLAN
AXONOMETRIC
35
15
145
95
30
2 - #10 x 50 mm (2") SCREWS COUNTERSUNK 8 mm (5/16")
PICKETS
45 x 138 TOP RAIL
3 - #10 x 50 mm (2") SCREWS COUNTERSUNK 8 mm (5/16")
45 x 255 STRINGER
FRONT ELEVATION
SIDE ELEVATION

Detail IH-1

Interior Stair Guard Connection: Cantilevered Picket Screwed to Stair Stringer

Notes:

1. Stair stringer shall be oak or maple.
2. Provide a suitable post, return, or solid support at each end of the guard.
3. See Table 3.1.2. for minimum sizes of pickets.
4. Dimensions shown are in mm unless otherwise specified

Appendix A

Explanatory Material for SB-7

Appendix A to this Supplementary Standard is included for explanatory purposes only and does not form part of the requirements. The bold-faced reference numbers that introduce each item apply to the requirements in this Supplementary Standard.

A-1.1.1. Scope. A guard constructed in conformance with this Supplementary Standard is deemed to satisfy the requirements of Sentence 9.8.8.8.(2) of Division B.

Guard design in Supplementary Standard is based on a height of 1 070 mm and a maximum clear spacing of 100 mm between pickets or balusters.

A-1.1.1.(2) Guards located on the exterior of a building are subject to deterioration as a result of hygrothermal, electrochemical or biochemical action.

A-1.2.1. Cantilever Action. Where guards incorporate wood posts that are continuous from the top of the guard to the ground, or where the tops of the posts are attached to a superstructure that is connected to the building, the cantilever assumption in the Supplementary Standards is no longer valid. An example of a continuous post is shown in Figure A-1.2.1.

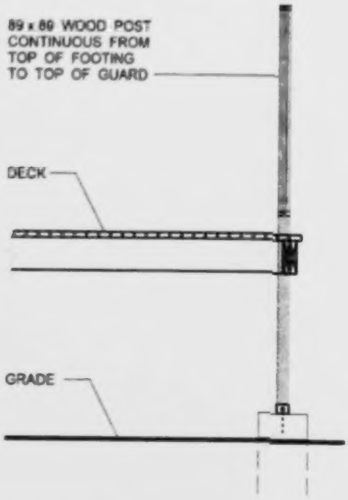


**Figure A-1.2.1.
Typical Continuous Post**

A-1.2.2. Classification. A Post and Rail System consists of a top rail that transfers horizontal loads to posts. The posts transfer the loads from the rail to the floor system. This system may incorporate a bottom rail that is anchored at each end to the posts. Infill panels or infill pickets are installed between the top rail and the floor or bottom rail. Examples of Post and Rail Systems are shown in Figure A-1.2.2.A.

The term "infill pickets" refers to an assembly of vertically oriented elements that span between the floor or bottom rail and the top rail. For the purpose of this Supplementary Standard, the words "picket" and "baluster" both relate to these individual elements.

The spacing of the posts in a Post and Rail System is detailed in this Supplementary Standard and is dictated by the ability of the posts to accept the design loads. The maximum spanning capacity of the rails is often not realised because it is dictated by the post spacing.

A Cantilevered Picket System consists of a top rail that transfers horizontal loads to pickets. The pickets transfer the loads from the top rail to the floor system. An example of a Cantilevered Picket System is shown in Figure A-1.2.2.B.

A guard classified as a Post and Rail System or a Cantilevered Picket System need not always terminate at a post if:
(a) the top rail is connected adequately to an element capable of accepting the forces applied to it, or
(b) the guard changes direction and the rails are adequately fastened at the return.

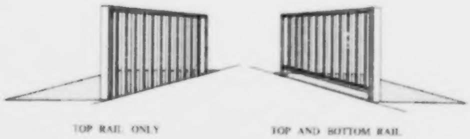


Figure A-1.2.2.A
Typical Post and Rail Systems

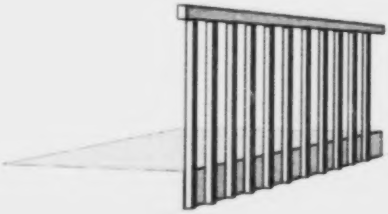


Figure A-1.2.2.B
Cantilevered Picket System

A-2.1.1. Lumber Grades. Whereas Northern Species is specified as the minimum lumber grade, Spruce-Pine-Fir, Douglas Fir-Larch and Hem-Fir may also be used since their structural properties exceed those of Northern Species. Cedar falls within the classification of Northern Species Group.

A-2.1.3. Floor Construction. The lateral loads acting on a guard are transferred from either the posts or the pickets to the floor system. Therefore, the floor system must be sufficiently strong to transfer these loads.

A-2.1.4. Connectors. Pre-drilling of wood elements may be required in order to avoid splitting of structural wood elements. Where a glued joint is required, an adhesive conforming to CSA Standard O112.4-M1977 (Polyvinyl Adhesives for Wood) and CSA Standard O112.8-M1977 (Polyvinyl Adhesives - Cross Linking, for Wood) is acceptable.

A-2.1.5. Decay-Resistant Lumber. Cedar is a species considered resistant to decay.

Ministry of Municipal Affairs and Housing
Building and Development Branch

Ontario

2006 Building Code – Supplementary Standards

Supplementary Standard SB-8

Design, Construction and Installation of Anchorage System for Fixed Access Ladders

August 15, 2006

Supplementary Standard
SB-8

COMMENCEMENT

Supplementary Standard SB-8 comes into force on the 31st day of December, 2006.

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SB-8 Design, Construction and Installation of Anchorage System for Fixed Access Ladders

DESIGN

The design, construction and installation of the anchorage system for a fixed access ladder shall be capable of withstanding the anticipated loads from the ladder.

The following are the minimum criteria to be used in the design:

- The minimum design live load should be two loads of 1.1 kN each concentrated between any two consecutive attachments.
- Other loads, such as concentrated loads, loads due to ice, wind, rigging and impact, and dead loads, must be considered in the design.
- A safety factor of at least 4:1 should be applied in designing components for normal usage, and at least 10:1 for components supporting fall-arrest systems.

ATTACHMENT AND ANCHORAGE

The attachment method must be rated for the intended structural service and take into consideration the type of wall or member which will support the ladder.

- Expansion anchors should be avoided with masonry walls. Since anchor manufacturers' pull-out ratings are usually given for poured concrete walls, they cannot be reliably attained in masonry walls.
- Through-bolted connections, or equivalent, must be used for masonry walls, and other walls for which there is no anchor manufacturers' pull-out rating. Generally, through-bolted connections should be used wherever practicable.
- Attachment and anchor bolts should have a minimum diameter of 12 mm.
- Maximum spacing of attachment points for a steel ladder with side rails shall be 3 m.
- For different materials or extra loads, this maximum spacing must be adjusted in accordance with recognized design practice.

To provide an improved margin of safety, there should be two means of anchoring the top of the ladder. This may be accomplished by fastening the side rail extension above the top of the access/egress level to the roof.

If a ladder is to be attached to an existing wall, the structural soundness of the wall must be investigated to ensure it is capable of supporting the ladder.

For additional information on fixed access ladders refer to Engineering Data Sheet 2-04, issued by the Ministry of Labour.

Ministry of Municipal Affairs and Housing
Building and Development Branch

Ontario

2006 Building Code – Supplementary Standards

Supplementary Standard SB-9

Requirements for Soil Gas Control

August 15, 2006

Supplementary Standard
SB-9

COMMENCEMENT

Supplementary Standard SB-9 comes into force on the 31st day of December, 2006.

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SB-9 Requirements for Soil Gas Control

Section 1 Soil Gas Control in Masonry Walls

1.1. Sealing of Masonry Walls

(1) Masonry walls required to provide a barrier to soil gas ingress shall
(a) include a course of masonry units without voids, or
(b) be sealed with flashing material extending across the full width of the masonry.

(2) The masonry course or flashing described in Sentence (1) shall
(a) be located at the level of the adjoining floor and be sealed to it in accordance with Subsection 3.3., or
(b) in the absence of a floor, be located at the level of the ground cover required by Article 9.18.6.1. of Division B and be sealed to it.

Section 2 Soil Gas Control in Underground Roofs

2.1. Sealing of Underground Roofs

(1) Waterproofing systems for roofs of underground structures shall be sealed to the soil gas barrier in the walls.

Section 3 Soil Gas Control in Floors

3.1. Soil Gas Barriers in Floors

(1) Where the floor-on-ground is a concrete slab, the soil gas barrier shall be
(a) installed below the slab, or
(b) applied to the top of the slab, provided a separate floor is installed over the slab.

(2) Where the soil gas barrier is installed below a slab-on-ground, joints in the barrier shall be lapped not less than 300 mm.

(3) Where the soil gas barrier is installed above a slab-on-ground, joints in the barrier shall be sealed.

(4) Where installed in conjunction with a framed floor-on-ground, the soil gas barrier shall be installed in accordance with Articles 9.25.3.2. and 9.25.3.3. of Division B.

3.2. Providing for Subfloor Depressurization

(1) Except as required in Sentence (3), granular material shall be installed below the floor-on-ground according to Sentence 9.16.2.1.(1) of Division B.

(2) A pipe not less than 100 mm in diameter shall be installed vertically through the floor, at or near its centre, such that
(a) its bottom end opens into the granular fill described in Sentence (1), and
(b) its top end will permit connection to depressurization equipment.

(3) The granular material described in Sentence (1), near the centre of the floor, shall be not less than 150 mm deep for a radius of not less than 300 mm centred on the pipe described in Sentence (2).

(4) The upper end of the pipe described in Sentence (2) shall be provided with a removable seal.

(5) The pipe described in Sentence (2) shall be clearly labelled to indicate that it is intended only for the removal of soil gas from below the floor-on-ground.

(6) Except as provided in Sentence (8), when a building constructed in accordance with Sentences (1) to (5) is complete, testing shall be conducted according to EPA 402-R-93-003, "Protocols for Radon and Radon Decay Product Measurements in Homes", to determine the radon concentration in the building.

(7) A copy of the results of testing required in Sentence (6) shall be provided by the building owner to the authority having jurisdiction.

(8) The testing required in Sentence (6) shall include basement concentration measurements.

(9) Where the radon concentration determined as described in Sentences (6) and (8) exceeds the Canadian Action Level for radon in residential indoor air, as specified in HC H46-2/90-156E, "Exposure Guidelines for Residential Indoor Air Quality", a subfloor depressurization system shall be installed to reduce the radon concentration to a level below the Canadian Action Level.

(10) Where a subfloor depressurization system is installed,
(a) makeup air shall be provided as specified in Article 9.32.3.8. of Division B, and
(b) measures shall be taken to ensure that any resultant decrease in soil temperature will not adversely affect the foundation.

3.3. Sealing of the Perimeter and Penetrations

(1) A floor-on-ground shall be sealed around its perimeter to the inner surfaces of adjacent walls using flexible sealant.

(2) All penetrations of a floor-on-ground by pipes or other objects shall be sealed against soil gas leakage.

(3) All penetrations of a floor-on-ground that are required to drain water from the floor surface shall be sealed in a manner that prevents the upward flow of soil gas without preventing the downward flow of liquid water.

Notes to SB-9 Soil Gas Barriers:

There are two principal methods of excluding soil gas:

- Sealing the interface between the soil and the occupied space, so far as is reasonably practicable.
- Ensuring that the pressure difference across the soil/space interface is positive (i.e., towards the outside) so that inward soil gas flow through any remaining leaks will be prevented.

Soil Gas Barriers. The requirements for Soil Gas Control in Walls, Soil Gas Barriers, and Sealing of the Perimeter and Penetrations, are illustrated in the following drawings. Sealing of penetrations of the slab also applies to hollow metal and masonry columns. Not only the perimeters but also the centres of such columns must be sealed or blocked.

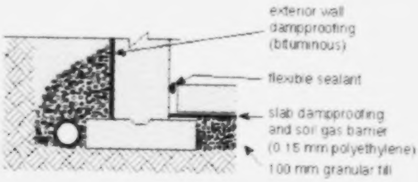
exterior wall dampproofing (bituminous)
flexible sealant
slab dampproofing and soil gas barrier (0.15 mm polyethylene)
100 mm granular fill

Figure SB-9A
Dampproofing and Soil Gas Control at Foundation Wall/floor Junctions with Solid Walls

The requirement regarding drainage openings in slabs can be satisfied with any of a number of proprietary devices which prevent soil gas entry through floor drains. Some types of floor drains incorporate a trap which is connected to a nearby tap so that the trap is filled every time the tap is used. This is intended to prevent the entry of sewer gas but would be equally effective against the entry of soil gas.

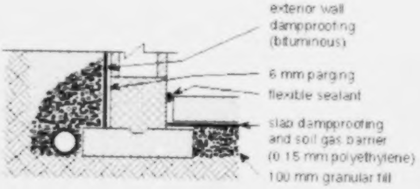
exterior wall dampproofing (bituminous)
6 mm parging
flexible sealant
slab dampproofing and soil gas barrier (0.15 mm polyethylene)
100 mm granular fill

Figure SB-9B
Dampproofing and Soil Gas Control at Foundation Wall/floor Junctions with Hollow Walls

Ministry of Municipal Affairs and Housing
Building and Development Branch

Ontario

2006 Building Code – Supplementary Standards

Supplementary Standard SB-10

Energy Efficiency Supplement

April 2, 2007 update

Supplementary Standard
SB-10

COMMENCEMENT

Supplementary Standard SB-10 comes into force on the 31st day of December, 2006.

m_2 Ruling of the Minister of Municipal Affairs and Housing (Minister's Ruling) MR-07-S-03 takes effect on the 2nd day of April, 2007.

ERRATA

e_1 Issued April 2nd, 2007.

ACKNOWLEDGEMENT

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SB-10 Energy Efficiency Supplement

Chapter 1 General
Section 1.1. Scope
1.1.1. Supplement to ANSI/ASHRAE/IESNA Standard 90.1
1.1.2. Supplement to MNECB

Section 1.2. Application
1.2.1. Application of ANSI/ASHRAE/IESNA Standard 90.1 and MNECB

Section 1.3. Additional Referenced Documents
1.3.1. Referenced Documents

Chapter 2 Supplement to ANSI/ASHRAE/IESNA Standard 90.1(1)
Section 4 Administration and Enforcement
Section 5 Building Envelope
Section 6 Heating, Ventilating and Air-Conditioning
Section 7 Service Water Heaters
Section 9 Lighting
Section 10 Other Equipment
Section 11 Energy Cost Budget Method

Chapter 3 Supplement to MNECB(2)
Part 3 Building Envelope
Part 4 Lighting
Part 5 Heating, Ventilating and Air-Conditioning Systems
Part 6 Service Water Heating Systems
Part 7 Electrical Power

(1) The Section numbers and titles listed in Chapter 2 of SB-10 correspond with those contained in ANSI/ASHRAE/IESNA Standard 90.1

(2) The Part numbers and titles listed in Chapter 3 of SB-10 correspond with those contained in MNEBC.

FOREWORD

The 2006 Building Code references ANSI/ASHRAE/IESNA Standard 90.1-2004, "Energy Standard for Buildings Except Low-Rise Residential Buildings" and CCFBC, "Model National Energy Code of Canada for Buildings, 1997" (MNECB) as acceptable good engineering practice. The application of the above documents to existing buildings is limited to the scope of Part 10 and Part 11 of the Code.

The intent of this Supplementary Standard is to assist the user of ANSI/SHRAE/IESNA Standard 90.1 and the MNECB by providing additional information to clarify and modify certain requirements in these documents to ensure compatibility with Ontario climatic conditions and Ontario construction practices.

In all cases, the 2006 Building Code, Supplementary Standard SB-10 and other applicable law supersede those requirements of ANSI/ASHRAE/IESNA Standard 90.1 and MNECB (ie. where the provisions of the Ontario Energy Efficiency Act are more restrictive than the requirements of ANSI/ASHRAE/IESNA Standard 90.1 and MNECB, the Energy Efficiency Act shall apply).

Compliance with this Supplementary Standard and ANSI/ASHRAE/IESNA Standard 90.1 or MNECB does not necessarily ensure that the actual annual energy cost of a building is less than or equal to the theoretical values arrived at using the building energy cost budget method of ANSI/ASHRAE/IESNA Standard 90.1 or building energy performance compliance of MNECB. Factors such as workmanship, thermal resistance depreciation of building materials, occupant/user lifestyle, building operation and maintenance, etc. impact on the actual energy consumption of a building.

SUMMARY OF THE CONTENTS OF SB-10

Chapter 1: General

This Chapter sets out the application and exemptions common to both ANSI/ASHRAE/IESNA Standard 90.1 and MNECB.

Chapter 2: Supplement to ANSI/ASHRAE/IESNA Standard 90.1.

This Chapter contains additions and/or substitutions to ANSI/ASHRAE/IESNA Standard 90.1. The Section numbers and the sequential numbering system that follow in this Chapter correspond directly with those in ANSI/ASHRAE/IESNA Standard 90.1. Where necessary, modifications have been made to the numbering system

Chapter 3: Supplement to MNECB

This Chapter contains additions and/or substitutions to MNECB. The Part numbers and the sequential numbering system that follow in this Chapter correspond directly with those in MNECB. Where necessary, modifications have been made to the numbering system.

Recommended Resource Material: ANSI/ASHRAE/IESNA Standard 90.1-2004 User's Manual

Chapter 1

General

1.1. Scope

1.1.1. Supplement to ANSI/ASHRAE/IESNA Standard 90.1

1.1.1.1. Chapter 2

(1) Chapter 2 shall be deemed to supplement the ANSI/ASHRAE/IESNA Standard 90.1, "Energy Standard for Buildings Except Low-Rise Residential Buildings", and applies where compliance with energy efficiency requirements is achieved in accordance with Clause 12.2.1.1.(2)(a) of Division B.

1.1.2. Supplement to MNECB

1.1.2.1. Chapter 3

(1) Chapter 3 shall be deemed to supplement the CCFBC, "Model National Energy Code of Canada for Buildings, 1997", and applies where compliance with energy efficiency requirements is achieved in accordance with Clause 12.2.1.1.(2)(b) of Division B.

1.2. Application

1.2.1. Application of ANSI/ASHRAE/IESNA Standard 90.1 and MNECB

1.2.1.1. Exceptions

(1) This Standard and the requirements of ANSI/ASHRAE/IESNA Standard 90.1 and MNECB do not apply to
(a) a building or part of a building of residential occupancy that is within the scope of Part 9 of Division B,
(b) a heritage building,
(c) any building space which uses energy at a rate less than 12 W/m² under peak conditions,
(d) temporary structures such as construction trailers, tents, air-supported structures and portable classrooms,
(e) warehouses and storage rooms where the design indoor temperature does not exceed 10°C, and
(f) unheated storage garages and unheated storage rooms except as required in Sentence (2).

(2) Conditioned spaces of buildings exposed to unheated storage garages and unheated storage rooms shall meet the building envelope requirements ANSI/ASHRAE/IESNA Standard 90.1 or MNECB.

(3) Energy consumption of systems and equipment located in a storage garage but which do not serve the storage garage need not be considered as energy used in the storage garage but shall be included as energy used for the rest of the building.

(4) The exceptions listed in Sentence 12.2.1.1.(5) of Division B exempts buildings or parts of buildings from compliance with energy efficient design requirements where

(a) the areas are intended primarily for manufacturing processing, commercial processing or industrial processing, and
(b) the environmental condition within the buildings or parts of buildings are governed by the operation or process within the building.

(5) Table 1.2.1.1. contains some examples of occupancies which can be exempted from compliance with ANSI/ASHRAE/IESNA Standard 90.1 and MNECB. The list is not intended to be exhaustive and other exemptions may be made.

Table 1.2.1.1.
Examples of Occupancies Exempt from Compliance with ANSI/ASHRAE/IESNA Standard 90.1 and MNECB

GROUP A, DIVISION 4	GROUP F, DIVISION 1	GROUP F, DIVISION 2	GROUP F, DIVISION 3
Amusement Park Structures (not elsewhere classified) Bleachers Grandstands Reviewing Stands Stadia	Bulk Plants for Flammable Liquids Bulk Storage Warehouses for Hazardous Substances Cereal Mills Chemical Manufacturing or Processing Plants Distilleries Dry Cleaning Plants Feed Mills Flour Mills Grain Elevators Lacquer Factories Paint, Varnish and Pyroxylin Product Factories Rubber Processing Plants Spray Painting Operations Waste Paper Processing Plants	Dry Cleaning Establishments not using flammable or explosive solvents or cleaners Electrical Substations Helicopter Landing Areas on Roofs Laundries, except self-service Planing Mills Printing Plants Repair Garages Woodworking Factories	Creameries Power Plants Open-air Parking Garages Pumping Stations
GROUP C			
Part 9 Buildings Camps for Housing Workers (Part 3 & 9 Buildings) Recreational Camps			
Column 1	2	3	4

Notes to Table 1.2.1.1.:

(1) Part 9 buildings are exempt from compliance with ANSI/ASHRAE/IESNA Standard 90.1 or MNECB where the energy efficiency design conforms to Subsection 12.3.4. of Division B.

1.3. Additional Referenced Documents

1.3.1. Referenced Documents

1.3.1.1. Applicable Editions

(1) Where this Supplementary Standard specifies substitutions to referenced documents specified in ANSI/ASHRAE/IESNA Standard 90.1 and MNECB, the referenced documents shall be in the editions designated in Column 2 of Table 1.3.1.1.

Table 1.3.1.1.
Additional Referenced Documents

Issuing Agency	Document Number	Title of Document	Supplementary Standard Reference
CGSB	CAN/CGSB-63.14-M89	Plastic Skylights	5.4.3.2.1 Chapter 2 5.4.3.2.2 Chapter 2
CGSB	CAN/CGSB-82.1-M89	Sliding Doors	5.4.3.2.1 Chapter 2 5.4.3.2.3 Chapter 2
CGSB	CAN/CGSB-82.5-M88	Insulated Steel Doors	5.4.3.2.1 Chapter 2
CSA	CGA P.2-1991	Testing Method for Measuring Annual Fuel Utilization Efficiencies of Residential Furnaces and Boilers	Table 7.8 Chapter 2
CSA	CGA-P.6-1993	Testing Method for Measuring Thermal and Operating Efficiencies of Gas-Fired Pool Heaters	Table 6.8.1E Chapter 2
CSA	CGA P.8-97	Thermal Efficiencies of Industrial and Commercial Gas-Fired Package Furnaces	Table 6.8.1E Chapter 2
CSA	ANSI Z21.47-2003 / CSA 2.3-2003	Gas-Fired Central Furnaces	Table 6.8.1E Chapter 2
CSA	ANSI Z83.8-2002 / CSA 2.6-2002	Gas Unit Heaters and Gas-Fired Duct Furnaces	Table 6.8.1E Chapter 2
CSA	CAN/CSA-P.3-2004	Testing Method for Measuring Energy Consumption and Determining Efficiencies of Gas-Fired Water Heaters	Table 7.8 Chapter 2
CSA	ANSI Z21.10.3-2004 / CSA 4.3-2004	Gas Water Heaters - Volume III, Storage Water Heaters With Input Ratings Above 75,000 Btu Per Hour, Circulating and Instantaneous	Table 7.8 Chapter 2
CSA	CAN/CSA-B211-00	Energy Efficiency of Oil-Fired Storage Tank Water Heaters	Table 7.8 Chapter 2
CSA	CSA B212-00	Energy Utilization Efficiencies of Oil-Fired Furnaces and Boilers	Table 6.8.1E Chapter 2
CSA	CAN/CSA-A440-00	Windows	5.4.3.2.1 Chapter 2 5.4.3.2.3 Chapter 2 5.4.3.2.4 Chapter 2
CSA	CAN/CSA-C191-04	Performance of Electric Storage Tank Water Heaters for Domestic Hot Water Service	Table 7.8 Chapter 2
CSA	CSA C368.1-M90	Performance Standard for Room Air Conditioners	Table 6.8.1D Chapter 2
CSA	CAN/CSA-C390-98	Energy Efficiency Test Methods for Three-Phase Induction Motors	10.4.1 Chapter 2
CSA	CAN/CSA-C654-M91	Fluorescent Lamp Ballast Efficacy Measurements	9.1.5.1.3 Chapter 2
CSA	CAN/CSA-C656-05	Performance Standard for Split-System and Single Package Central Air Conditioners and Heat Pumps	Table 6.8.1A Chapter 2 Table 6.8.1B Chapter 2
CSA	CAN/CSA-C743-02	Performance Standard for Rating Packaged Water Chillers	Table 6.8.1C Chapter 2
CSA	ARI 310/380-2004 / CAN/CSA-C744-04 /	Standard for Packaged Terminal Air Conditioners and Heat Pumps	Table 6.8.1D Chapter 2
CSA	CSA C745-03	Energy Efficiency of Electric Storage Tank Water Heaters and Heat Pump Water Heaters	Table 7.8 Chapter 2
CSA	CAN/CSA-C746-98	Performance Standard for Rating Large Air Conditioners and Heat Pumps	Table 6.8.1A Chapter 2 Table 6.8.1B Chapter 2 Table 6.8.1D Chapter 2
CSA	CAN/CSA-C13256-1-01	Water-Source Heat Pumps —Testing and Rating for Performance — Part 1: Water-to-Air Heat and Brine-to-Air Heat Pumps (Adopted ISO 13256-1:1998, first edition, 1998-08-15, with Canadian deviations)	Table 6.8.1B Chapter 2
Column 1	2	3	4

Chapter 2

Supplement to ANSI/ASHRAE/IESNA Standard 90.1

Section 4 Administration and Enforcement

4.2.1.1 is replaced with the following:

4.2.1.1 New Buildings. New buildings and additions to existing buildings shall comply with provisions of either Sections 5 to 10 or Section 11.

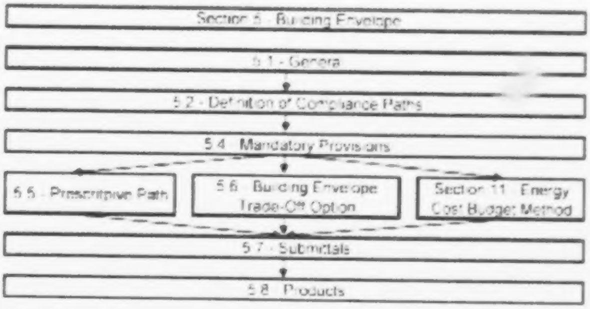
4.2.1.2 is replaced with the following:

4.2.1.1 Existing Buildings. Change of use of existing buildings shall conform to Part 10 of Division B. Renovation of existing buildings shall conform to Part 11 of Division B.

Section 5 Building Envelope

Section 5 is replaced with the following:

5. Building Envelope


Section 5 - Building Envelope
5.1 - General
5.2 - Definition of Compliance Paths
5.4 - Mandatory Provisions
5.5 - Prescriptive Path
5.6 - Building Envelope Trade-Off Option
Section 11 - Energy Cost Budget Method
5.7 - Submittals
5.8 - Products

5.1 General

5.1.1 Scope. Section 5 specifies requirements for the building envelope.

5.1.2 Reserved.

5.1.3 Reserved.

5.2 Compliance Paths

5.2.1 Compliance. The building envelope shall comply with 5.1, General; 5.3, Required Calculation Procedures; 5.4, Mandatory Provisions; 5.7, Submittals; and 5.8, Product Information and Installation Requirements; and either
(a) 5.5, Prescriptive Criteria, using Tables of Alternate Component Packages (ACP), or
(b) 5.6, System Performance Criteria.

5.2.2 Projects using the Energy Cost Budget Method (Section 11), must comply with 5.3 and 5.4, the mandatory provisions of this section, as a portion of that compliance path.

5.3 Required Calculation Procedures. The following procedures shall be used to calculate the thermal performance of above- and below-grade envelope sections of any building that is heated or mechanically cooled.

5.3.1 Overall Thermal Transmittance (Uo). The overall thermal transmittance of the building envelope assembly shall be calculated in accordance with:

$$
\begin{aligned}
U_o &= \sum U_i A_i / A_o \\
&= (U_1 A_1 + U_2 A_2 + \cdots + U_n A_n)/A_o \qquad (5\text{-}1)
\end{aligned}
$$

where

U_o = the area-weighted average thermal transmittance of the gross area of an envelope assembly, i.e., the exterior wall assembly including fenestration and doors, the roof and ceiling assembly, and the floor assembly.
A_o = the gross area of the envelope assembly.
U_i = the thermal transmittance of each individual path of the envelope assembly, i.e., the opaque portion or the fenestration. (see 5.3.2)
U_i = $1/R_i$ (where R_i is the total resistance to heat flow of an individual path through an envelope assembly).
A_i = the area of each individual element of the envelope assembly.

5.3.2 Thermal Transmittance (U_i) of an Individual Path through an Envelope Assembly.

5.3.2.1 Except as permitted in 5.3.2.2, the thermal transmittance of each envelope assembly shall be determined with due consideration of all major series and parallel heat flow paths through the elements of the assembly and film coefficients. Compression of insulation shall be considered in determining the thermal resistance. The thermal transmittance of each envelope assembly shall be calculated in accordance with ASHRAE 2005 Fundamentals or Appendix A of this Standard.

5.3.2.2 For the purposes of Section 5, the effects of thermal bridging are waived for:
(a) intermediate structural connections of continuous steel shelf angles (or similar structural element) used to support the building facade provided there is a thermal break between the remaining contact surface of the supporting element and the building structure. This provision is intended to substantially reduce thermal bridging effects caused by the continuous bearing between structural elements supporting building facade and the building frame (ie. steel shelf angle attached to perimeter floor slab to support brick veneer), or
(b) structural connections of load bearing elements where a thermal break cannot be achieved.

5.3.2.2.1. In addition to the exceptions permitted above, the effects of thermal bridging are also waived for:

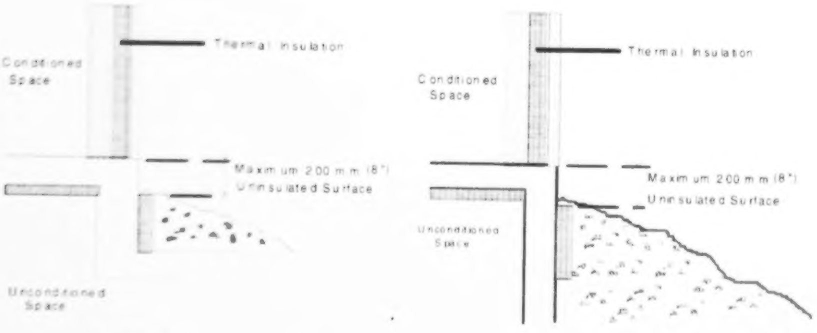
(a) exposed structural projections of buildings where the total cross-sectional area of the exposed element does not exceed 2% of the exterior building envelope area and the cross-sectional area of the exposed structural element is measured where it penetrates the insulation component of the building envelope. For example, the total cross-sectional area of cantilevered concrete balconies and other projections penetrating the insulation component of the building envelope cannot exceed 2% of the exterior building envelope area,

(b) ties in masonry construction,

(c) insulation clips in masonry construction,

(d) flashing, and

(e) top exposed portion of foundation walls provided the exposure does not exceed 200 mm measured from the top of the foundation wall to the top of exterior wall insulation which meets the minimum insulation RSI-Value for wall below grade stipulated in the appropriate Alternate Component Package Tables. (See Figure 5-1)



Example A

Example B

Figure 5-1 Maximum Uninsulated Surface of Foundation Wall

5.3.3 Reserved.

5.3.4 Shading Coefficients. The shading coefficient (SC) for fenestration shall be obtained from Chapter 31 of the ASHRAE Handbook—2005 Fundamentals or from manufacturer's test data. For the prescriptive or system performance envelope compliance calculations in 5.5 and 5.6, a factor SC_x is used. SC_x is the shading coefficient of the fenestration including internal and external shading devices but excluding the effect of external shading projections, which is calculated separately. The shading coefficient used for louvered shade screens shall be determined using a profile angle of 30° as found in Table 41, Chapter 27, of ASHRAE Handbook - 1985 Fundementals.

5.3.5 Reserved.

5.3.6 Shell Buildings. The following conditions shall be assumed when determining building envelope compliance by either the prescriptive method of 5.5 or the system performance method of 5.6.

(a) **Lighting power density and equipment power density:** For 5.5, the total power density shall be assumed to be those listed in Table 5-1. For 5.6, the values in Table 5-1 shall be apportioned as two-thirds lighting and one-third for other equipment. Note that these are not recommended design values but are for compliance purposes only to simulate the most stringent compliance situation that is likely to occur.

(b) **Fenestration shading devices:** Only those shading devices that are part of the design when it is being evaluated for compliance shall be considered when determining compliance.

(c) **Electric lighting controls for perimeter daylighting utilization:** Only those controls that are part of the design when it is being evaluated for compliance shall be considered when determining compliance.

Table 5-1
Assumed Internal Loads For Shell and Speculative Buildings

Shell Buildings	HDD18 < 1650	(HDD65 < 3000)	1650 < HDD18 < 3300	(3000 < HDD65 < 6000)	HDD18 > 3300	(HDD65 > 6000)
	32.3 W/m^2	(3.00 W/ft^2)	24.2 W/m^2	(2.25 W/ft^2)	16.1 W/m^2	(1.5 W/ft^2)
Speculative Buildings	Use the lighting power densities from Table 9.6.1 and the average equipment power density from Table 5-4					
Column 1	2		3		4	

5.3.7 Reserved.

5.3.8 Reserved.

5.3.9 Thermal Resistance of Below-Grade Components (RSI). In all below-grade applications, the thermal performance of the adjacent ground shall be excluded in determining the thermal resistance of the below-grade components.

5.3.9.1 Slabs. The RSI-Value and dimensions required for slabs refer only to the insulation materials. Insulation continuity shall be maintained in the design of slab edge insulation systems. Continuity shall be maintained from the wall insulation through the slab/wall/footing intersection to the body of the slab edge insulation. Several representative configurations are illustrated in Figure 5-2.

5.3.9.1.1 Where insulative continuity is impossible because of structural constraints, a minimum overlapping of insulation is acceptable. The insulation must overlap by a distance equal to (or greater than) two times the minimum insulation separation, as shown in Figure 5-3. The overlapping insulation must have a thermal resistance (R-Value) equal to or greater than that specified for the wall below grade in the Alternate Component Package Tables (or from the Standard 90.1 ENVSTD23 or ENVSTD24 Envelope Software).

5.3.9.2 Below-Grade Walls. The RSI-Value required for below-grade walls refers to the overall RSI-Value of the wall assembly excluding air film coefficients and the adjacent ground.

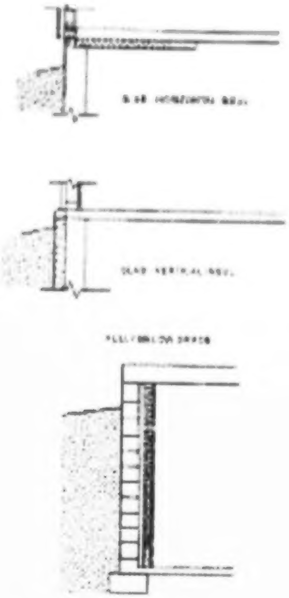


Figure 5-2 Insulation Continuity of Insulation on or Below Grade

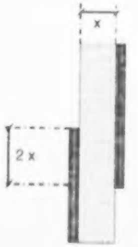


Figure 5-3 Maximum Permissible Insulation Overlap

5.4 Mandatory Provisions

5.4.1 Insulation. Where insulation is required in 5.5 or 5.6, it shall comply with the requirements found in 5.8.1.1 to 5.8.1.9.

5.4.2 Fenestration and Doors. Procedures for determining fenestration and door performance are described in 5.8.2. Product samples used for determining fenestration performance shall be production line units or representative of units purchased by the consumer or contractor.

5.4.3 Air Leakage

5.4.3.1 Building Envelope Sealing. The following areas of the building envelope shall be sealed, caulked, gasketed, or weather-stripped to minimize air leakage:

(a) joints around fenestration and door frames,

(b) junctions between walls and foundations, between walls at building corners, between walls and structural floors or roofs, and between walls and roof or wall panels,

(c) openings at penetrations of utility services through roofs, walls, and floors,

(d) site-built fenestration and doors,

(e) building assemblies used as ducts or plenums,

(f) joints, seams, and penetrations of vapor retarders,

(g) all other openings in the building envelope.

5.4.3.2 Fenestration and Doors

5.4.3.2.1 Except as provided in 5.4.3.2.4, where components of the air barrier system are covered in the scope of the standards listed below, the components shall conform to the requirements of the respective standards:

(a) CAN/CGSB-63.14-M, "Plastic Skylights",

(b) CAN/CGSB-82.1-M, "Sliding Doors",

(c) CAN/CGSB-82.5-M, "Insulated Steel Doors", or

(d) CAN/CSA-A440-M, "Windows".

5.4.3.2.2. Skylights not covered in the scope of CAN/CGSB-63.14-M, "Plastic Skylights" shall conform to the performance requirements of that standard.

5.4.3.2.3 Except as provided in 5.4.3.2.4, windows and sliding doors covered in the scope of CAN/CGSB-82.1-M, "Sliding Doors", and CAN/CSA-A440, "Windows" which are installed as components in an air barrier system shall conform at least to the airtightness requirements in CAN/CSA-A440.1, "User Selection Guide to CAN/CSA-A440-00, Windows".

5.4.3.2.4 Where a wired glass assembly is installed as a component in an air barrier system in a required fire separation, the assembly need not conform to CAN/CSA-A440, "Windows" or CAN/CSA-A440.1, "User Selection Guide to CAN/CSA-A440-00, Windows".

5.4.3.3 Loading Dock Weatherseals. Cargo doors and loading dock doors shall be equipped with weatherseals to restrict infiltration when vehicles are parked in the doorway.

5.4.3.4 Vestibules. A door that separates conditioned space from the exterior shall be protected with an enclosed vestibule, with all doors opening into and out of the vestibule equipped with self-closing devices. Vestibules shall be designed so that in passing through the vestibule it is not necessary for the interior and exterior doors to open at the same time.

Exceptions to 5.4.3.4:

(a) Doors in buildings less than five stories above grade.

(b) Doors not intended to be used as a building entrance door, such as doors as to mechanical or electrical equipment rooms.

(c) Doors opening directly from a dwelling unit.

(d) Doors that open directly from a space less than 279 m² (3000 ft²) in area.

(e) Doors in building entrances with revolving doors.

(f) Doors used primarily to facilitate vehicular movement or material handling and adjacent personnel doors.

(g) Doors intended to be used as a service or emergency exit door only.

5.5 Prescriptive Criteria

5.5.1 Purpose. This section provides a simple compliance path using pre-calculated prescriptive requirements for selected exterior envelope configurations.

5.5.2 Reserved.

5.5.3 General. Each alternate component package (ACP) provides a limited number of complying combinations of building variables for a set of climate variable ranges. For most climate locations and envelope parameters, the Prescriptive Criteria may be slightly more stringent than the System Performance Criteria of 5.6.

For buildings with high internal heat gains, unusual operating schedules, or applications of innovative design strategies not covered in 5.5, consideration shall be given to using the provisions of Section 11.

The ACPs provide design criteria for the following:

(a) **Base Case Buildings:** buildings with envelopes designed without perimeter daylighting.

(b) **Perimeter Daylighting Buildings:** buildings that are allotted additional fenestration area due to the incorporation of automatic electric lighting controls for daylight utilization in the perimeter zones.

5.5.4 Compliance. The envelope design of the building being evaluated is in compliance with the prescriptive criteria of 5.5 provided that all of the following are met:

(a) The proposed design complies with 5.1, 5.3, 5.4, 5.5, 5.7, and 5.8.

(b) The percentage of fenestration relative to the gross external wall area is less than or equal to the value chosen from the selected ACP Table for the internal load range and glazing selected.

(c) All U-Values are less than or equal to those listed in the ACP Table for roofs, opaque walls, walls adjacent to unconditioned spaces, and floors over unconditioned spaces.

(d) Slab-on-grade floors shall have insulation around the perimeter of the floor with the thermal resistance of the insulation as listed in the ACP Table. The slab insulation specified shall extend either in a vertical plane downward from the top of the slab for the minimum distance shown or downward to the bottom of the slab then in a horizontal plane beneath the slab or outward from the building for the minimum distance shown. The horizontal length, or vertical depth, of insulation required varies from 600 mm to 1200 mm (24 in. to 48 in.) depending upon the RSI-Value selected. For heated slabs, an RSI-Value of 0.35 (R-2) shall be added to the thermal resistance required. Vertical insulation shall not be required to extend below the foundation footing.

(e) The thermal resistance of the below-grade wall assembly must be greater than or equal to that listed in the ACP Table, or the heat loss calculated in accordance with Chapter 30 of the ASHRAE Handbook—2005 Fundamentals shall be less than or equal to that of a wall below grade having a thermal resistance equal to that specified in Figure 5-6. No insulation is required for climates for those portions of wall more than one story below grade.

(f) When a building is heated by electric space heating, the envelope design shall meet the requirements prescribed in 5.5.5.1.3.

5.5.5 Procedure for Using the Alternative Component Package (ACP) Tables. The Prescriptive Envelope Criteria for each of 5 climate ranges for Ontario are contained in Tables 5A-1, 5A-2, 5A-3, 5A-4 or 5AA of this Supplement. This Supplement also contains simplified versions of ACP Tables which are provided as Tables 5A-1S, 5A-2S, 5A-3S, 5A-4S or 5A-5S. The following steps shall be used to determine compliance with these criteria.

5.5.5.1 Determine Appropriate ACP Table. Climate data for most Ontario locations, including HDD18 C (equivalent to HDD65 F), are available in Supplementary Standard SB-1. Table 5A-G1 of this Supplement contains location numbers corresponding to Ontario locations for Standard 90.1 ENVSTD23 or ENVSTD24 Envelope Software. Table 5A-G2 of this Supplement contains climatic data for heating and cooling degree day ratings along with the appropriate ACP Table reference corresponding to a particular Ontario location number.

The applicable ACP Table shall be determined based on Tables 5A-G1, 5A-G2 and the 5A-G3. Table 5A-G3 shall apply only buildings that are heated by electric space heating. Where electric space heating is used, applicable Table will be determined based on 5A-G3 after determining which Table would be applicable based on 5A-G1 and G2, as if, the electric space heating was not used.

Table 5A-G1
Location Numbers and Ontario Locations for Standard 90.1 ENVSTD23 or ENVSTD24 Envelope Software

No.	Location	No.	Location	No.	Location	No.	Location
281	Ailsa Craig	334	Cobourg	334	Guthrie	236	Martin
333	Ajax	331	Cochrane	260	Haileybury	331	Matheson
292	Alexandria	334	Colborne	281	Haldimand	291	Mattawa
343	Alliston	343	Collingwood	287	Haliburton	343	Midland
292	Almonte	292	Cornwall	333	Halton Hills	281	Milton
241	Armstrong	345	Corunna	333	Hamilton	343	Milverton
292	Arnprior	291	Deep River	343	Hanover	287	Minden
236	Atikokan	334	Deseronto	334	Hastings	333	Mississauga
334	Aurora	281	Dorchester	292	Hawkesbury	281	Mitchell
287	Bancroft	330	Dorion	277	Hearst	241	Moosonee
334	Barrie	345	Dresden	343	Honey Harbour	292	Morrisburg
334	Barriefield	278	Dryden	277	Hornepayne	287	Mount Forest
287	Beaverton	281	Dunnville	287	Huntsville	287	Muskoka
334	Belleville	343	Durham	281	Ingersoll	277	Nakina
281	Belmont	281	Dutton	331	Iroquois Falls	281	Nanticoke
241	Big Trout Lake	260	Earlton	277	Jellicoe	334	Napanee
343	Bordon CFB	278	Edison	277	Kapuskasing	334	Newcastle
287	Bracebridge	343	Elmvale	292	Kemptville	260	New Liskeard
334	Bradford	281	Embro	278	Kenora	334	Newmarket
333	Brampton	260	Englehart	291	Killaloe	345	Niagara Falls
281	Brantford	323	Espanola	281	Kincardine	291	North Bay
334	Brighton	281	Exeter	334	Kingston	334	Norwood
334	Brockville	287	Fenelon Falls	287	Kinmount	333	Oakville
287	Burks Falls	343	Fergus	260	Kirkland Lake	343	Orangeville
345	Burlington	281	Forest	281	Kitchener	343	Orillia
281	Cambridge	333	Fort Erie	334	Lakefield	333	Oshawa
334	Campbellford	278	Fort Frances	241	Lansdowne House	292	Ottawa
287	Cannington	334	Gananoque	345	Leamington	343	Owen Sound
292	Carleton Place	277	Geraldton	287	Lindsay	277	Pagwa River
334	Cavan	281	Glencoe	343	Lion's Head	281	Paris
281	Centralia	281	Goderich	343	Listowel	281	Parkhill
236	Chapleau	270	Gore Bay	281	London	287	Parry Sound
345	Chatham	236	Graham	281	Lucan	333	Pelham
343	Chesley	287	Gravenhurst	292	Maitland	292	Pembroke
281	Clinton	345	Grimsby	343	Markdale	343	Penetanguishene
287	Coboconk	281	Guelph	333	Markham	292	Perth

Table 5A-G1 (Cont'd)
Reference Numbers and Ontario Locations for Standard 90.1 ENVSTD23 or ENVSTD24 Envelope Software

No	Location	No	Location	No.	Location	No.	Location
292	Petawawa	292	Renfrew	281	Stratford	333	Vaughan
334	Peterborough	333	Richmond Hill	281	Strathroy	281	Vittoria
281	Petrolia	292	Rockland	291	Sturgeon Falls	343	Walkerton
333	Pickering	281	Sarnia	323	Sudbury	345	Wallaceburg
334	Picton	314	Sault Ste.Marie	291	Sundridge	281	Waterloo
281	Plattsville	330	Schreiber	281	Tavistock	281	Watford
292	Point Alexander	281	Seaforth	260	Temagami	330	Wawa
281	Port Burwell	281	Simcoe	281	Thamesford	345	Welland
333	Port Colborne	319	Sioux Lookout	281	Thedford	345	West Lorne
343	Port Elgin	292	Smiths Falls	330	Thunder Bay	333	Whitby
334	Port Hope	333	Smithville	281	Tilsonburg	236	White River
334	Port Perry	277	Smooth Rock Falls	331	Timmins	343	Wiarton
281	Port Stanley	343	Southampton	333	Toronto/ Metropolitan Etobicoke North York Scarborough	345	Windsor
292	Prescott	291	South River			281	Wingham
281	Princeton	345	St. Catharines			281	Woodstock
236	Raith	281	St. Marys	334	Trenton	281	Wyoming
323	Rayside-Balfour	281	St. Thomas	291	Trout Creek		
319	Red Lake	334	Stirling	334	Uxbridge		

Table 5A-G2
Reference Ontario Locations in Standard 90.1 ENVSTD23 and ENVSTD24 Envelope Software (SI Units)

Location Number	HDD10	HDD18	VSN	VSEW	VSS	CDD10	CDD18	CDH27	DR	No. Hrs T < 12.8	8 am - 4 pm 12.8 ≤ T ≤ 20.6	ACP Table
236	3794	6191	2465	7180	9929	712	77	161	14.0	1975	647	5A-5
241	5173	7757	2511	6896	10485	489	42	27	10.1	2273	492	5A-5
260	3632	5996	2772	6930	9258	759	91	235	13.1	1946	627	5A-5
270	2665	4884	2454	7327	9417	915	103	62	10.3	1833	755	5A-3
277	4074	6524	2863	6771	9156	654	74	193	13.3	2059	572	5A-5
278	3736	5987	2624	7498	10417	920	139	187	10.3	1920	632	5A-5
281	2163	4198	2681	7089	8429	1213	216	358	12.1	1635	679	5A-2
287	2756	4986	2772	7202	8952	907	106	169	13.0	1749	718	5A-3
291	3159	5436	2829	6864	9020	853	98	72	10.5	1908	715	5A-4
292	2679	4758	2363	6748	9099	1164	212	407	11.4	1738	657	5A-3
314	2883	5206	2556	6941	8884	787	79	127	13.1	1914	701	5A-4
319	3988	6337	2533	7134	10054	786	104	188	11.4	1970	611	5A-5
323	3250	5513	2613	7009	9327	884	116	193	11.4	1909	657	5A-4
330	3443	5851	2420	7384	10315	684	61	177	13.4	1973	671	5A-4
331	3886	6303	2772	6861	9270	694	79	231	13.9	2012	588	5A-5
333	2163	4218	2340	6657	8316	1201	224	510	12.5	1654	669	5A-2
334	2229	4282	2806	7418	9327	1181	202	205	11.1	1659	711	5A-3
343	2359	4559	2829	7066	8202	950	118	114	10.9	1767	741	5A-3
345	1819	3687	2636	7282	8827	1535	372	781	10.9	1542	646	5A-1

Table 5A-G2
Reference Ontario Locations in Standard 90.1 ENVSTD23 and ENVSTD24 Envelope Software (Imperial Units)

Location Number	HDD50	HDD65	VSN	VSEW	VSS	CDD50	CDD65	CDH80	DR	No. Hrs T < 55	8 am - 4 pm 55 ≤ T ≤ 69	ACP Table
236	6829	11144	217	632	874	1281	138	289	25.2	1975	647	5A-5
241	9312	13963	221	607	923	881	75	49	18.1	2273	492	5A-5
260	6538	10792	244	610	815	1367	164	423	23.6	1946	627	5A-5
270	4797	8791	216	645	829	1647	185	112	18.5	1833	755	5A-3
277	7333	11744	252	596	806	1178	133	347	23.9	2059	572	5A-5
278	6724	10776	231	660	917	1656	251	336	18.5	1920	632	5A-5
281	3893	7556	236	624	742	2183	389	645	21.7	1635	679	5A-2
287	4960	8974	244	634	788	1632	190	305	23.4	1749	718	5A-3
291	5687	9785	249	613	794	1536	176	129	18.9	1908	715	5A-4
292	4822	8565	208	594	801	2095	381	732	20.6	1738	657	5A-3
314	5190	9371	225	611	782	1417	142	229	23.5	1914	701	5A-4
319	7178	11407	223	628	885	1415	187	338	20.6	1970	611	5A-5
323	5850	9924	230	617	821	1591	209	347	20.6	1909	657	5A-4
330	6198	10532	213	650	908	1232	109	318	24.1	1973	671	5A-4
331	6995	11346	244	604	816	1249	143	415	25.1	2012	588	5A-5
333	3894	7593	206	586	732	2161	404	918	22.5	1654	669	5A-2
334	4012	7707	247	653	821	2126	364	369	19.9	1659	711	5A-3
343	4247	8206	249	622	722	1710	213	206	19.7	1767	741	5A-3
345	3274	6636	232	641	777	2763	669	1405	19.6	1542	646	5A-1

Table 5A-G3
Electric Space Heating

ACP Table based on 5A-G1 and 5A-G2, assuming that the building is not heated by electric space heating	Applicable ACP Table for a building that is heated by electric space heating
5A-1 or 5A-1S	5A-3 or 5A-3S
5A-2 or 5A-2S	5A-4 or 5A-4S
5A-3 or 5A-3S	5A-5 or 5A-5S
5A-4 or 5A-4S	5A-5 or 5A-5S
5A-5 or 5A-5S	5A-5 or 5A-5S

For Ontario locations not listed in Table 5A-G1, select the location that is climatologically closest to the climatic data listed in Table 5A-G2 along with the appropriate ACP Table.

5.5.5.1.1 Simplified ACP Tables. Simplified ACP Tables 5A-1S, 5A-2S, 5A-3S, 5A-4S or 5A-5S of this Supplement may be used in lieu of ACP Tables 5A-1, 5A-2, 5A-3, 5A-4 or 5A-5. These Simplified ACP Tables offer flexibility with choice of U-Values and shading coefficients of fenestration as well as heat capacity of opaque wall assembly in order to determine maximum percent fenestration. The Simplified ACP Tables assume an internal load density (ILD) of 16.14 W/m^2 (1.5 W/ft^2) and projection factor (PF) of 0.0. Perimeter daylighting criteria has not been accounted for in the Simplified ACP Tables.

The envelope design of a proposed building is in compliance with the Simplified ACP Tables provided that:

1. All envelope thermal transmittance (U-Values) for the proposed building design are less than or equal to those in the appropriate Simplified ACP Table for fenestration, opaque walls, roofs, walls adjacent to unconditioned spaces, and floors over unconditioned spaces.
2. All envelope thermal transmittance (RSI-Values) for the proposed building design are greater than or equal to those in the appropriate ACP Table for walls below grade and slabs on grade.

The required U_{ot} for the desired percentage of fenestration is determined using the appropriate Simplified ACP Table as determined in 5.5.5.1. Select either the heated and cooled building or the heated-only building column as appropriate. The maximum overall U-Value (U_{ot}) for fenestration is shown under that column. Fenestration assemblies in the proposed building design shall not exceed the maximum fenestration U_{ot} in the Table.

Exception. For the purposes of the ACP Tables and the Simplified ACP Tables, where fenestration consists of fixed sealed windows in combination with operable windows, the fenestration U-Values for the fixed sealed window portion may also be used for the operable window portion provided the area of the operable window portion does not exceed 20% of the total area of the window unit. The operable window portion need not consist of sealed windows but shall contain the same framing material, shading coefficient and number of glazing layers as the fixed sealed portion of the window unit.

In the Simplified ACP Tables, the maximum U is determined based on the heat capacity (HC) of the opaque wall assembly. The heat capacity is the product of the specific heat and the mass of the opaque wall components. Select the maximum opaque wall U in the row with the appropriate range of HC for the proposed design. Opaque wall assemblies in the proposed design shall not exceed the maximum opaque wall U in the Table.

5.5.5.2 Determine the Maximum Allowable Percent Fenestration. Using the appropriate ACP Table as determined in 5.5.5.1, determine the maximum allowable percent fenestration. The maximum allowable percent fenestration is the total area of fenestration assemblies divided by the total gross exterior wall area, considering all elevations of the building.

Determining the maximum allowable percent fenestration requires the following five steps (a) to (e):

(a) Based on the internal load density (ILD) for the proposed design, select one of the three internal load ranges as the point of entry to the Tables. Note: For ILDs greater than 37.6 W/m^2 (3.5 W/ft^2), use 5.6.

Determine the internal load density (ILD) of the proposed design, based on the sum of the lighting power density (LPD), the equipment power density (EPD), and occupant load adjustment (OLA), as shown in Equation 5-2.

$$ILD = LPD + EPD + OLA \quad (5-2)$$

where

The lighting power density (LPD) shall be one of the following:

1. the building average lighting power density in W/m^2 (W/ft^2) as determined from the building lighting power allowance from 9.5 or 9.6 divided by the gross lighted floor area.
2. the average of the lighting power allowances for all activity areas within 4.5 m (15 ft) of each exterior wall divided by the sum of those activity areas, based on the procedures specified in 9.6.
3. the actual lighting power density of the proposed design in W/m^2 (W/ft^2), either building average or average of the lighting power within 4.5 m (15 ft) of each exterior wall.

The equipment power density (EPD) shall be either:

1. either the building average receptacle power density selected from Table 5-4 in W/m^2 (W/ft^2), or

2. or the actual average receptacle power density for all activity areas within 4.5 m (15 ft) of each exterior wall in W/m^2 (W/ft^2), considering diversity. For determining compliance with the ACP Tables, the actual average receptacle power densities calculated by this method that exceed 10.7 W/m^2 (1.0 W/ft^2) shall be limited to 10.7 W/m^2 (1.0 W/ft^2) in Equation 5-2.

Table 5-4
Average Receptacle Power Densities

Building Type	W/m^2	(W/ft^2)
Assembly	2.69	(0.25)
Office	8.07	(0.75)
Retail	2.69	(0.25)
Warehouse	1.08	(0.10)
School	5.32	(0.50)
Hotel or Motel	2.69	(0.25)
Restaurant	1.08	(0.10)
Health	10.76	(1.00)
Multifamily	8.07	(0.75)
Column 1	2	

The occupant load adjustment (OLA) shall be

1. either 0.0 W/m^2 (W/ft^2), which recognizes the assumed occupant sensible load of 6.46 W/m^2 (0.6 W/ft^2) that is built into the ACP Tables, or
2. a positive or negative difference between the actual occupant load and 6.46 W/m^2 (0.6 W/ft^2) if the design building has a larger or smaller occupant load.

(b) Select the external shading projection factor (PF). If no external shading projections are used in the proposed design, select the projection factor (PF) range of 0.000 to 0.249. If external shading projections are used, determine the average area-weighted projection factor on the window, then select the appropriate column in the ACP Table.

$$PF = P_d / H \quad (5\text{-}3)$$

where

PF = external shading projection factor;
P_d = external horizontal shading projection depth;
H = sum of height of the fenestration and the distance from the top of the fenestration to the bottom of the external shading projection in units consistent with P_d.

(c) Select the shading coefficient of the fenestration (SCx) including internal, integral, and external shading devices but excluding the effect of external shading projections (PF). Note that this includes curtains, shades, or blinds. Reference ASHRAE Handbook—1985 Fundamentals, Chapter 27.

(d) Select one of the daylighting options:
1. either base case, no daylighting,
2. or perimeter daylighting (automatic daylight controls for lighting system must be used). Note that this option is not available in some locations.

(e) Select appropriate fenestration type. For most options, this is determined by the thermal transmittance value (U_{of}) of the fenestration assembly. For some fenestration options (see ACP Tables), the visible light transmittance of the fenestration (VLT) should not be less than the shading coefficient of the glazed portion of the fenestration assembly, not considering any shading devices. The ranges generally correspond to single glazing, double glazing, triple glazing, and high performance glazing incorporating low-emissivity coatings/films or more than two glazing layers. Each ACP Table includes, at most, three ranges of glazing U-Values.

5.5.5.3 Determine the Maximum U_{ow} for the Opaque Wall Assembly. In the appropriate ACP Table, the maximum U_{ow} for the opaque wall assembly is determined using the following steps.

(a) For a lightweight wall assembly, heat capacity (HC) less than 100.3 kJ/(m^2.K) (5 Btu/(ft^2·°F)), use the value indicated. This U_{ow} is constant over all internal load ranges.

(b) To use the mass wall adjustment, the following additional steps are necessary:
1. Select the same internal load range as that used in determining the maximum allowable percent fenestration.
2. Select the mass wall heat capacity (HC) and insulation position. If the wall insulation is positioned internal to or integral with the wall mass, use the column headed Interior Insulation. If the wall insulation is positioned external to the wall mass, use the column headed Exterior Insulation. For HC less than 100.3 kJ/(m^2·K) (5 Btu/(ft^2·°F)), this adjustment Table cannot be used. At this step you will have two choices of U_{ow} that are keyed to a small or large percent fenestration. This represents the full range of U_{ow} values allowed.
3. Select or interpolate for the appropriate maximum U_{ow} for the opaque wall based on the maximum allowable percent fenestration determined in 5.5.5.2 or the actual building percent fenestration, whichever value is lower. The U_{ow} shall be determined by straight line interpolation for fenestration percentages between the smallest and largest values listed. If the design building percentage fenestration is less than the smallest value listed, select the U_{ow} for the smallest percentage fenestration listed. If the design building percentage fenestration is greater than the largest value listed, select the U_{ow} for the largest percentage fenestration listed.

5.5.5.4 Determine Other Envelope Criteria. In each ACP Table, the criteria for roof, wall adjacent to unconditioned space, wall below grade (first story only), floor over unconditioned space, and slab-on-grade floors shall be met. For heated slabs-on-grade, the RSI-Value shall be the RSI-Value for the unheated slab-on-grade plus RSI-0.35 (R-2.0).

5.5.5.5 Skylights The total skylight area shall be less than 5% of the gross roof area.

(a) The skylights, including framing shall have an minimum overall thermal transmittance of 3.97 $W/(m^2 \cdot K)$ (0.7 $Btu/(h \cdot ft^2 \cdot {}^\circ F)$)

(b) Skylit curbs have thermal transmittance U-Values less than or equal to 1.19 $W/(m^2 \cdot K)$ (0.21 $Btu/(h \cdot ft^2 \cdot {}^\circ F)$).

(c) The infiltration coefficient of the skylights is less than or equal to 0.25 $L/s\text{-}m^2$ (0.05 cfm/ft^2).

5.5.5.5.1 Skylit areas may be increased by 50% if a shading device is used that blocks over 50% of the solar gain during the peak cooling design condition.

5.6 System Performance Criteria

5.6.1 Purpose. The following provisions of 5.6 provide a system approach to compliance with the envelope requirements of this standard. They provide more flexibility than the prescriptive approach of 5.5 but also require more analysis.

5.6.2 Reserved.

5.6.3 General. For building designs with high internal heat gains or unusual operating schedules or that incorporate innovative design strategies not covered in the following provisions of 5.6, consideration shall be given to using the provisions of Section 11.

5.6.4 Compliance. The building envelope shall comply with the provisions of 5.1, 5.3, 5.4, 5.6, 5.7, and 5.8.

5.6.5 Compliance with System Performance Criteria. Compliance with System Performance Criteria shall be demonstrated by either

(a) use of envelope compliance Standard 90.1 ENVSTD 23 or ENVSTD24 Envelope Software, or

(b) calculations.

5.6.6 Where the envelope compliance software referred in 5.6.5(a) is used, the System Performance Criteria for a given climate zone impeded in the program shall be acceptable and the output of the software verifying compliance shall be deemed to be demonstration of compliance with System Compliance Criteria.

5.6.6.1 Applicable climate zone shall be determined based on 5.5.5.1 and Tables 5A-G1 to 5A-G3. Where appropriate, variations may be made based on local weather patterns (experience and professional judgment should be applied).

5.6.7 Where the calculation method used to demonstrate compliance with the System Performance Criteria, the thermal transmittance requirements of roofs, floors, walls above and below grade and fenestration shall be determined based on methods required in 8.6 of ASHRAE/IES 90.1-1989.

5.6.8 For the purpose of 5.6.5, lighting power density, equipment power density, and loads from occupants used in calculating the compliance value shall be either the building average calculated in accordance with 5.5 or the average of actual load.

5.8 Product Information and Installation Requirements

5.8.1 Insulation

5.8.1.1 Labelling of Building Envelope Insulation. The RSI-Value shall be clearly identified by an identification mark applied by the manufacturer to each piece of building envelope insulation.

Exception to 5.8.1.1: When insulation does not have such an identification mark, the installer of such insulation shall provide a signed and dated certification for the installed insulation listing the type of insulation, the manufacturer, the RSI-Value, and, where appropriate, the initial installed thickness, the settled thickness, and the coverage area.

5.8.1.2 Compliance with Manufacturer's Requirements. Insulation materials shall be installed in accordance with manufacturer's recommendations and in such a manner as to achieve the RSI-Value of insulation.
Exception to 5.8.1.2: Where metal building roof and metal building wall insulation is compressed between the roof or wall skin and the structure.

5.8.1.3 Loose-fill Insulation Limitation. Where loose-fill insulation is installed in an unconfined sloped space, such as an attic space over a sloped ceiling, the supporting slope shall not be more than

(a) 4.5 in 12 for mineral fibre or cellulose fibre insulation, and
(b) 2.5 in 12 for other types of insulation.

5.8.1.4 Baffles. When eave vents are installed, baffling of the vent openings shall be provided to deflect the incoming air above the surface of the insulation.

5.8.1.5 Installation. Insulation shall be installed in a permanent manner in accordance with manufacturer's recommendations for the framing system used. Flexible batt insulation installed in floor cavities shall be supported in a permanent manner by supports no greater than 600 mm (24 in) on center.
Exception to 5.8.1.5: Insulation materials that rely on air-spaces adjacent to reflective surfaces for their rated performance.

5.8.1.6 Recessed Equipment. Lighting fixtures; heating, ventilating, and air-conditioning equipment, including wall heaters, ducts, and plenums; and other equipment shall not be recessed in such a manner as to affect the insulation thickness unless:

(a) the total combined area affected (including necessary clearances) is less than one percent of the opaque area of the assembly, or
(b) the entire roof, wall, or floor is covered with insulation to the full depth required, or
(c) the effects of reduced insulation are included in calculations using an area-weighted average method and compressed insulation values obtained from Table A9.4.C of ANSI/ASHRAE/IESNA Standard 90.1. In all cases, air leakage through or around the recessed equipment to the conditioned space shall be limited in accordance with 5.4.3.

5.8.1.7 Insulation Protection. Exterior insulation shall be covered with a protective material to prevent damage from sunlight, moisture, landscaping operations, equipment maintenance, and wind.

5.8.1.7.1 In attics and mechanical rooms, a way to access equipment that prevents damaging or compressing the insulation shall be provided.

5.8.1.7.2 Foundation vents shall not interfere with the insulation.

5.8.1.7.3 Insulation materials in ground contact shall have a water absorption rate no greater than 0.3% when tested in accordance with ASTM C272.

5.8.1.8 Location of Roof Insulation. The roof insulation shall not be installed on a suspended ceiling with removable ceiling panels.

5.8.1.9 Extent of Insulation. Insulation shall extend over the full component area, unless otherwise allowed in 5.8.1.

5.8.2 Fenestration

5.8.2.1 Rating of Fenestration Products. The overall thermal transmittance (U_{ot}) value for all manufactured products shall be determined by

(a) in conformance with 8.4.2.2. of ASHRAE 90.1-1989, or
(b) a laboratory accredited by a nationally recognized accreditation organization.

Table 5A-1(1)(3)(4)
Alternate Component Packages for Location Number 345 (SI Units)
HDD10 = 1780-2220, CDD18 = 281-640, VSEW = 6362-9599

Design Parameters			Maximum Percent Fenestration					
			Fenestration U-Value (Uof)					
			Base Case			Perimeter Daylighting(2)		
						VLT < SC		VLT ≥ SC
Internal Load Density (ILD) Range	Projection Factor (PF) Range	Shading Coefficient (SCx) Range	3.36 to 2.96	2.95 to 2.22	2.21 to 0.00	3.36 to 2.96	2.95 to 2.22	2.21 to 0.00
0.00 – 16.14	0.00 - 0.25	1.00 - 0.72	21	22	23	22	23	25
		0.71 - 0.61	24	25	28	25	26	30
		0.60 - 0.51	27	28	32	27	29	34
		0.50 - 0.39	29	32	36	30	33	38
		0.38 - 0.26	32	36	43	32	36	45
		0.25 - 0.00	35	40	53	34	39	52
	0.26 - 0.50	1.00 - 0.72	28	29	33	29	31	35
		0.71 - 0.61	31	33	38	31	34	41
		0.60 - 0.51	33	36	43	33	37	45
		0.50 - 0.39	35	39	48	34	38	50
		0.38 - 0.00	36	41	55	35	40	54
	0.51 +	1.00 - 0.72	33	36	41	33	36	44
		0.71 - 0.61	35	39	47	34	39	50
		0.60 - 0.51	36	41	52	35	40	54
		0.50 - 0.00	37	43	56	36	41	56
16.15 – 32.28	0.00 - 0.25	1.00 - 0.72	16	18	19	22	23	25
		0.71 - 0.61	21	21	23	25	26	30
		0.60 - 0.51	23	24	26	26	30	34
		0.50 - 0.39	26	28	31	31	33	39
		0.38 - 0.26	31	33	38	33	37	47
		0.25 - 0.00	36	40	49	37	42	55
	0.26 - 0.50	1.00 - 0.72	24	25	27	29	30	36
		0.71 - 0.61	27	29	32	32	34	41
		0.60 - 0.51	30	32	36	34	37	46
		0.50 - 0.39	33	36	41	35	39	51
		0.38 - 0.00	37	41	49	37	42	56
	0.51 +	1.00 - 0.72	29	31	34	33	36	45
		0.71 - 0.61	32	35	40	35	39	51
		0.60 - 0.51	35	38	45	37	41	55
		0.50 - 0.00	37	41	50	38	43	57
32.29 – 37.66	0.00 - 0.25	1.00 - 0.72	16	16	17	21	22	25
		0.71 - 0.61	18	19	20	24	26	29
		0.60 - 0.51	21	22	23	27	29	34
		0.50 - 0.39	24	25	27	30	32	38
		0.38 - 0.26	28	30	34	33	37	46
		0.25 - 0.00	35	38	45	37	41	55
	0.26 - 0.50	1.00 - 0.72	21	22	23	28	29	35
		0.71 - 0.61	24	26	28	31	33	40
		0.60 - 0.51	27	29	32	33	36	45
		0.50 - 0.39	30	32	37	35	39	50
		0.38 - 0.00	35	38	44	37	42	56
	0.51 +	1.00 - 0.72	26	27	30	32	35	44
		0.71 - 0.61	29	31	35	35	38	50
		0.60 - 0.51	32	35	40	36	40	54
		0.50 - 0.00	35	38	45	37	42	57

Maximum Wall U-Value (Uow) Light-weight Walls		
ILD Range 0.00 - 37.66		
Percent Fenestration	HC Range	All Insulation Positions
0 - 100	0.0 – 100.2	0.432

Maximum Wall U-Value (Uow) Mass Walls			
ILD Range 0.00 - 16.14			
Percent Fenestration	HC Range	Interior Insulation	Exterior Insulation
21	100.3 - 202.4	0.449	0.568
	202.5 - 304.6	0.483	0.625
	304.7 +	0.511	0.625
56	100.3 - 202.4	0.449	0.511
	202.5 - 304.6	0.477	0.568
	304.7 +	0.494	0.625
ILD Range 16.15 - 32.28			
Percent Fenestration	HC Range	Interior Insulation	Exterior Insulation
16	100.3 - 202.4	0.454	0.568
	202.5 - 304.6	0.494	0.681
	304.7 +	0.534	0.681
56	100.3 - 202.4	0.449	0.511
	202.5 - 304.6	0.477	0.568
	304.7 +	0.494	0.625
ILD Range 32.29 - 37.66			
Percent Fenestration	HC Range	Interior Insulation	Exterior Insulation
16	100.3 - 202.4	0.454	0.568
	202.5 - 304.6	0.500	0.681
	304.7 -	0.539	0.681
57	100.3 - 202.4	0.449	0.511
	202.5 - 304.6	0.477	0.568
	304.7 -	0.500	0.625

Notes to Table 5A-1:

(1) See Table 5AA for other envelope criteria to Table 5A-1.

(2) Perimeter daylighting must use daylight sensing controls.

(3) This Table represents stringent criteria. Use of the System Performance Path (Standard 90.1 ENVSTD 23 or ENVSTD24 Envelope Software) can produce criteria that are substantially less stringent, in some cases, and can provide greater compliance flexibility.

(4) Units for variables: U-Values - W/(m²·K) ILD - W/m² HC - kJ/(m²·K)

Table 5A-2[(1),(3),(4)]
Alternate Component Packages for Location Number 281, 333 (SI Units)
HDD10 = 1780-2220, CDD18 = 0-280, VSEW = 6362-9599

Design Parameters			**Maximum Percent Fenestration**				
Internal Load Density (ILD) Range	Projection Factor (PF) Range	Shading Coefficient (SCx) Range	Fenestration U-Value (Uof)				
			Base Case			Perimeter Daylighting[2]	
						VLT < SC	VLT ≥ SC
			3.35 to 2.96	2.95 to 2.22	2.21 to 0.00	N/A	N/A
0.00 - 16.14	0.00 - 0.25	1.00 - 0.72	26	29	30		
		0.71 - 0.61	29	33	36		
		0.60 - 0.51	31	37	42		
		0.50 - 0.39	33	41	47		
		0.38 - 0.26	34	46	56		
		0.25 - 0.00	34	49	66		
	0.26 - 0.50	1.00 - 0.72	33	39	43		
		0.71 - 0.61	35	44	50		
		0.60 - 0.51	36	48	56		
		0.50 - 0.39	36	50	63		
		0.38 - 0.00	36	52	70		
	0.51 -	1.00 - 0.72	37	47	54		
		0.71 - 0.61	38	51	62		
		0.60 - 0.51	38	53	68		
		0.50 - 0.00	38	54	73		
16.15 – 32.28	00 - 0.25	1.00 - 0.72	22	24	25		
		0.71 - 0.61	26	28	30		
		0.60 - 0.51	28	32	35		
		0.50 - 0.39	31	36	40		
		0.38 - 0.26	34	43	50		
		0.25 - 0.00	38	50	63		
	0.26 - 0.50	1.00 - 0.72	29	33	35		
		0.71 - 0.61	32	38	42		
		0.60 - 0.51	35	42	48		
		0.50 - 0.39	37	46	54		
		0.38 - 0.00	39	51	64		
	0.51 -	1.00 - 0.72	34	41	45		
		0.71 - 0.61	37	46	53		
		0.60 - 0.51	38	50	59		
		0.50 - 0.00	40	53	66		
32.29 – 37.66	0.00 - 0.25	1.00 - 0.72	20	22	22		
		0.71 - 0.61	23	26	27		
		0.60 - 0.51	26	29	31		
		0.50 - 0.39	29	33	37		
		0.38 - 0.26	33	40	45		
		0.25 - 0.00	37	48	59		
	0.26 - 0.50	1.00 - 0.72	27	30	32		
		0.71 - 0.61	30	35	38		
		0.60 - 0.51	33	39	43		
		0.50 - 0.39	35	43	49		
		0.38 - 0.00	38	49	59		
	0.51 -	1.00 - 0.72	32	37	41		
		0.71 - 0.61	35	42	48		
		0.60 - 0.51	37	46	54		
		0.50 - 0.00	39	50	60		

Maximum Wall U-Value (Uow) Light-weight Walls		
ILD Range 0.00 - 37.66		
Percent Fenestration	HC Range	All Insulation Positions
0 - 100	0.0 - 100.2	0.409

Maximum Wall U-Value (Uow) Mass Walls			
ILD Range 0.00 - 16.14			
Percent Fenestration	HC Range	Interior Insulation	Exterior Insulation
26	100.3 - 202.4	0.426	0.568
	202.5 - 304.6	0.466	0.625
	304.7 -	0.494	0.681
73	100.3 - 202.4	0.426	0.511
	202.5 - 304.6	0.454	0.625
	304.7 -	0.483	0.625
ILD Range 16.15 - 32.28			
Percent Fenestration	HC Range	Interior Insulation	Exterior Insulation
22	100.3 - 202.4	0.432	0.568
	202.5 - 304.6	0.477	0.681
	304.7 -	0.517	0.738
66	100.3 - 202.4	0.426	0.568
	202.5 - 304.6	0.466	0.681
	304.7 -	0.505	0.681
ILD Range 32.29 - 37.66			
Percent Fenestration	HC Range	Interior Insulation	Exterior Insulation
20	100.3 - 202.4	0.432	0.568
	202.5 - 304.6	0.483	0.681
	304.7 -	0.522	0.738
60	100.3 - 202.4	0.426	0.568
	202.5 - 304.6	0.471	0.681
	304.7 -	0.511	0.681

Notes to Table 5A-2:

(1) See Table 5AA for other envelope criteria to Table 5A-2.

(2) Perimeter daylighting must use daylight sensing controls.

(3) This Table represents stringent criteria. Use of the System Performance Path (Standard 90.1 ENVSTD 23 or ENVSTD24 Envelope Software) can produce criteria that are substantially less stringent, in some cases, and can provide greater compliance flexibility.

(4) Units for variables: U-Values - W/(m²·K) ILD - W/m² HC - kJ/(m²·K)

Table 5A-3(1),(3),(4)
Alternate Component Packages for Location Number 270, 287, 292, 334, 343 (SI Units)
HDD10 = 2221-2780, CDD18 = 0-640, VSEW = 6362-9599

Design Parameters			**Maximum Percent Fenestration**				
			Fenestration U-Value (Uof)				
			Base Case			Perimeter Daylighting(2)	
Internal Load Density (ILD) Range	Projection Factor (PF) Range	Shading Coefficient (SCx) Range				VLT < SC	VLT SC
			2.95 to 2.22	2.21 to 1.71	1.70 to 0.00	N/A	N/A
0.00 - 16.14	0.00 - 0.25	1.00 - 0.72	23	25	26		
		0.71 - 0.61	26	29	31		
		0.60 - 0.51	28	33	36		
		0.50 - 0.39	31	37	42		
		0.38 - 0.26	30	43	51		
		0.25 - 0.00	29	42	60		
	0.26 - 0.50	1.00 - 0.72	30	34	37		
		0.71 - 0.61	33	39	44		
		0.60 - 0.51	33	43	50		
		0.50 - 0.39	32	48	56		
		0.38 - 0.00	31	46	66		
	0.51 +	1.00 - 0.72	35	42	48		
		0.71 - 0.61	34	47	55		
		0.60 - 0.51	33	50	62		
		0.50 - 0.00	32	48	68		
16.15 - 32.28	0.00 - 0.25	1.00 - 0.72	19	20	21		
		0.71 - 0.61	22	24	25		
		0.60 - 0.51	25	28	30		
		0.50 - 0.39	28	32	35		
		0.38 - 0.26	32	38	43		
		0.25 - 0.00	33	45	57		
	0.26 - 0.50	1.00 - 0.72	26	28	30		
		0.71 - 0.61	29	33	36		
		0.60 - 0.51	32	37	41		
		0.50 - 0.39	34	42	47		
		0.38 - 0.00	34	47	57		
	0.51 +	1.00 - 0.72	31	35	39		
		0.71 - 0.61	34	41	46		
		0.60 - 0.51	35	45	52		
		0.50 - 0.00	35	49	58		
32.29 - 37.66	0.00 - 0.25	1.00 - 0.72	17	18	19		
		0.71 - 0.61	20	22	23		
		0.60 - 0.51	23	25	26		
		0.50 - 0.39	26	29	31		
		0.36 - 0.26	30	35	39		
		0.25 - 0.00	33	45	53		
	0.26 - 0.50	1.00 - 0.72	23	25	27		
		0.71 - 0.61	26	30	32		
		0.60 - 0.51	29	34	37		
		0.50 - 0.39	32	38	43		
		0.38 - 0.00	34	45	52		
	0.51 +	1.00 - 0.72	28	32	34		
		0.71 - 0.61	32	37	41		
		0.60 - 0.51	34	41	46		
		0.50 - 0.00	35	45	53		

Maximum Wall U-Value (Uow) Light-weight Walls		
ILD Range 0.00 - 37.66		
Percent Fenestration	HC Range	All Insulation Positions
0 - 100	0.0 – 100.2	0.369

Maximum Wall U-Value (Uow) Mass Walls			
ILD Range 0.00 - 16.14			
Percent Fenestration	HC Range	Interior Insulation	Exterior Insulation
23	100.3 - 202.4	0.380	0.488
	202.5 - 304.6	0.409	0.545
	304.7 +	0.432	0.568
68	100.3 - 202.4	0.380	0.471
	202.5 - 304.6	0.403	0.534
	304.7 +	0.426	0.551
ILD Range 16.15 - 32.28			
Percent Fenestration	HC Range	Interior Insulation	Exterior Insulation
19	100.3 - 202.4	0.386	0.505
	202.5 - 304.6	0.414	0.568
	304.7 +	0.443	0.625
58	100.3 - 202.4	0.380	0.494
	202.5 - 304.6	0.409	0.562
	304.7 +	0.437	0.568
ILD Range 32.29 - 37.66			
Percent Fenestration	HC Range	Interior Insulation	Exterior Insulation
17	100.3 - 202.4	0.386	0.511
	202.5 - 304.6	0.420	0.568
	304.7 +	0.449	0.625
53	100.3 - 202.4	0.380	0.500
	202.5 - 304.6	0.414	0.568
	304.7 +	0.437	0.625

Notes to Table 5A-3:

(1) See Table 5AA for other envelope criteria to Table 5A-3.

(2) Perimeter daylighting must use daylight sensing controls.

(3) This Table represents stringent criteria. Use of the System Performance Path (Standard 90.1 ENVSTD 23 or ENVSTD24 Envelope Software) can produce criteria that are substantially less stringent in some cases, and can provide greater compliance flexibility.

(4) Units for variables: U-Values - $W/(m^2\cdot K)$ ILD - W/m^2 HC - $kJ/(m^2\cdot K)$

Table 5A-4(1)(3)(4)
Alternate Component Packages for Location Number 291, 314, 323, 330 (SI Units)
HDD10 = 2781-3610, CDD18 = 0-640, VSEW = 6362-9599

Design Parameters			**Maximum Percent Fenestration**				
			Fenestration U-Value (Uof)				
Internal Load Density (ILD) Range	Projection Factor (PF) Range	Shading Coefficient (SCx) Range	Base Case			Perimeter Daylighting(2)	
						VLT < SC	VLT SC
			2.95 to 2.22	2.21 to 1.71	1.70 to 0.00	N/A	N/A
0.00 - 16.14	0.00 - 0.25	1.00 - 0.72	28	30	33		
		0.71 - 0.61	29	35	39		
		0.60 - 0.51	30	38	44		
		0.50 - 0.39	31	41	49		
		0.38 - 0.26	30	43	56		
		0.25 - 0.00	29	42	59		
	0.26 - 0.50	1.00 - 0.72	32	40	46		
		0.71 - 0.61	33	44	52		
		0.60 - 0.51	32	46	57		
		0.50 - 0.39	32	46	61		
		0.38 - 0.00	31	45	64		
	0.51 +	1.00 - 0.72	34	40	58		
		0.71 - 0.61	33	48	62		
		0.60 - 0.51	32	47	66		
		0.50 - 0.00	32	46	68		
16.15 - 32.28	0.00 - 0.25	1.00 - 0.72	23	25	27		
		0.71 - 0.61	25	29	32		
		0.60 - 0.51	28	33	36		
		0.50 - 0.39	30	36	42		
		0.38 - 0.26	31	41	49		
		0.25 - 0.00	32	44	59		
	0.26 - 0.50	1.00 - 0.72	29	34	37		
		0.71 - 0.61	31	38	43		
		0.60 - 0.51	32	41	48		
		0.50 - 0.39	32	44	53		
		0.38 - 0.00	33	45	61		
	0.51 +	1.00 - 0.72	32	40	46		
		0.71 - 0.61	32	44	52		
		0.60 - 0.51	33	46	57		
		0.50 - 0.00	33	46	62		
32.29 - 37.66	0.00 - 0.25	1.00 - 0.72	21	23	24		
		0.71 - 0.61	24	27	29		
		0.60 - 0.51	26	30	34		
		0.50 - 0.39	29	34	38		
		0.38 - 0.26	31	39	46		
		0.25 - 0.00	33	45	57		
	0.26 - 0.50	1.00 - 0.72	27	31	34		
		0.71 - 0.61	29	35	40		
		0.60 - 0.51	32	38	45		
		0.50 - 0.39	33	42	50		
		0.38 - 0.00	34	46	57		
	0.51 +	1.00 - 0.72	31	37	43		
		0.71 - 0.61	33	41	49		
		0.60 - 0.51	34	44	53		
		0.50 - 0.00	34	47	56		

Maximum Wall U-Value (Uow) **Light-weight Walls**		
ILD Range 0.00 - 37.66		
Percent Fenestration	HC Range	All Insulation Positions
0 - 100	0.0 - 100.2	0.329

Maximum Wall U-Value (Uow) **Mass Walls**			
ILD Range 0.00 - 16.14			
Percent Fenestration	HC Range	Interior Insulation	Exterior Insulation
26	100.3 - 202.4	0.335	0.403
	202.5 - 304.6	0.352	0.443
	304.7 -	0.363	0.454
66	100.3 - 202.4	0.335	0.403
	202.5 - 304.6	0.352	0.437
	304.7 -	0.363	0.449
ILD Range 16.15 - 32.2			
Percent Fenestration	HC Range	Interior Insulation	Exterior Insulation
23	100.3 - 202.4	0.335	0.414
	202.5 - 304.6	0.352	0.454
	304.7 -	0.369	0.471
62	100.3 - 202.4	0.335	0.409
	202.5 - 304.6	0.352	0.449
	304.7 -	0.363	0.460
ILD Range 32.29 - 37.66			
Percent Fenestration	HC Range	Interior Insulation	Exterior Insulation
21	100.3 - 202.4	0.341	0.414
	202.5 - 304.6	0.358	0.460
	304.7 -	0.369	0.471
58	100.3 - 202.4	0.335	0.409
	202.5 - 304.6	0.352	0.454
	304.7 -	0.369	0.466

Notes to Table 5A-4:

(1) See Table 5AA for other envelope criteria to Table 5A-4.

(2) Perimeter daylighting must use daylight sensing controls.

(3) This Table represents stringent criteria. Use of the System Performance Path (Standard 90.1 ENVSTD 23 or ENVSTD24 Envelope Software) can produce criteria that are substantially less stringent, in some cases, and can provide greater compliance flexibility.

(4) Units for variables: U-Values - $W/(m^2 \cdot K)$ ILD - W/m^2 HC - $kJ/(m^2 \cdot K)$

Table 5A-5$_{(1),(3),(4)}$
Alternate Component Packages for Location No. 236, 241, 260, 277, 278, 319, 331 (SI Units)
HDD10 > 3610, CDD18 < 55, VSEW < 6362

Design Parameters			**Maximum Percent Fenestration**				
			Fenestration U-Value (Usf)				
			Base Case			Perimeter Daylighting[2]	
Internal Load Density (ILD) Range	Projection Factor (PF) Range	Shading Coefficient (SCx) Range				VLT < SC	VLT > SC
			2.95 to 2.22	2.21 to 1.71	1.70 to 0.00	N/A	N/A
0.00 – 16.14	0.00 - 0.25	1.00 - 0.72	30	40	50		
		0.71 - 0.61	29	42	54		
		0.60 - 0.51	27	42	56		
		0.50 - 0.39	25	39	57		
		0.38 - 0.26	24	36	54		
		0.25 - 0.00	21	32	48		
	0.26 - 0.50	1.00 - 0.72	29	44	58		
		0.71 - 0.61	27	42	60		
		0.60 - 0.51	26	40	60		
		0.50 - 0.39	24	37	57		
		0.38 - 0.00	23	34	52		
	0.51 +	1.00 - 0.72	27	43	62		
		0.71 - 0.61	25	40	61		
		0.60 - 0.51	24	37	57		
		0.50 - 0.00	23	35	53		
16.15 – 32.28	0.00 - 0.25	1.00 - 0.72	27	35	42		
		0.71 - 0.61	27	37	47		
		0.60 - 0.51	27	38	49		
		0.50 - 0.39	26	38	52		
		0.38 - 0.26	25	36	52		
		0.25 - 0.00	24	34	49		
	0.26 - 0.50	1.00 - 0.72	28	40	51		
		0.71 - 0.61	27	40	53		
		0.60 - 0.51	26	39	55		
		0.50 - 0.39	25	37	54		
		0.38 - 0.00	24	36	52		
	0.51 +	1.00 - 0.72	27	40	55		
		0.71 - 0.61	26	39	56		
		0.60 - 0.51	25	38	55		
		0.50 - 0.00	25	36	53		
32.29 – 37.66	0.00 - 0.25	1.00 - 0.72	28	36	43		
		0.71 - 0.61	29	38	47		
		0.60 - 0.51	30	40	50		
		0.50 - 0.39	29	41	53		
		0.38 - 0.26	28	41	56		
		0.25 - 0.00	27	39	55		
	0.26 - 0.50	1.00 - 0.72	31	41	51		
		0.71 - 0.61	30	42	55		
		0.60 - 0.51	30	43	57		
		0.50 - 0.39	29	42	58		
		0.38 - 0.00	28	40	58		
	0.51 +	1.00 - 0.72	30	43	56		
		0.71 - 0.61	30	43	58		
		0.60 - 0.51	29	42	59		
		0.50 - 0.00	28	41	59		

Maximum Wall U-Value (Uow) Light-weight Walls		
ILD Range 0.00 – 37.66		
Percent Fenestration	HC Range	All Insulation Positions
0 - 100	0.0 – 100.2	0.256

Maximum Wall U-Value (Uow) Mass Walls			
ILD Range 0.00 – 16.14			
Percent Fenestration	HC Range	Interior Insulation	Exterior Insulation
21	100.3 - 202.4	0.261	0.290
	202.5 - 304.6	0.261	0.290
	304.7 -	0.267	0.290
62	100.3 - 202.4	0.261	0.307
	202.5 - 304.6	0.267	0.318
	304.7 -	0.273	0.318
ILD Range 16.15 - 32.28			
Percent Fenestration	HC Range	Interior Insulation	Exterior Insulation
24	100.3 - 202.4	0.261	0.301
	202.5 - 304.6	0.267	0.307
	304.7 -	0.267	0.307
56	100.3 - 202.4	0.261	0.307
	202.5 - 304.6	0.267	0.312
	304.7 -	0.273	0.312
ILD Range 32.29 - 37.66			
Percent Fenestration	HC Range	Interior Insulation	Exterior Insulation
27	100.3 - 202.4	0.261	0.307
	202.5 - 304.6	0.267	0.312
	304.7 -	0.267	0.307
59	100.3 - 202.4	0.261	0.307
	202.5 - 304.6	0.267	0.312
	304.7 -	0.273	0.312

Notes to Table 5A-5:

(1) See Table 5AA for other envelope criteria to Table 5A-5.

(2) Perimeter daylighting must use daylight sensing controls.

(3) This Table represents stringent criteria. Use of the System Performance Path (Standard 90.1 ENVSTD 23 or ENVSTD24 Envelope Software) can produce criteria that are substantially less stringent, in some cases, and can provide greater compliance flexibility.

(4) Units for variables: U-Values - $W/(m^2 \cdot K)$ ILD - W/m^2 HC - $kJ/(m^2 \cdot K)$

Table 5AA(1)(2)
Other Envelope Criteria (Si Units)

Other Envelope Criteria for Table 5A-1					
Minimum RSI-Value				Maximum U-Value	
Wall below grade	1.76			Roof	0.278
Unheated slab on grade	0.6 m	0.9 m	1.2 m	Wall adjacent to unconditioned space	0.681
Horizontal installation	3.17	2.64	1.94		
Vertical installation	1.41	1.06	0.7	Floor over unconditioned space	0.25
Other Envelope Criteria for Table 5A-2					
Minimum RSI-Value				Maximum U-Value	
Wall below grade	1.94			Roof	0.278
Unheated slab on grade	0.6 m	0.9 m	1.2 m	Wall adjacent to unconditioned space	0.625
Horizontal installation	3.17	2.64	1.94		
Vertical installation	1.41	1.06	0.7	Floor overuUnconditioned space	0.227
Other Envelope Criteria for Table 5A-3					
Minimum RSI-Value				Maximum U-Value	
Wall below grade	2.11			Roof	0.256
Unheated slab on grade	0.6 m	0.9 m	1.2 m	Wall adjacent to unconditioned space	0.625
Horizontal installation	3.17	2.64	1.94		
Vertical installation	1.41	1.06	0.7	Floor over unconditioned space	0.221
Other Envelope Criteria for Table 5A-4					
Minimum RSI-Value				Maximum U-Value	
Wall below grade	2.29			Roof	0.227
Unheated slab on grade	0.6 m	0.9 m	1.2 m	Wall adjacent to unconditioned space	0.568
Horizontal installation	3.17	2.64	1.94		
Vertical installation	1.41	1.06	0.7	Floor over unconditioned space	0.221
Other Envelope Criteria for Table 5A-5					
Minimum RSI-Value				Maximum U-Value	
Wall below grade	2.82			Roof	0.176
Unheated slab on grade	0.6 m	0.9 m	1.2 m	Wall adjacent to unconditioned space	0.494
Horizontal installation	3.17	2.64	1.94		
Vertical installation	1.41	1.06	0.7	Floor over unconditioned space	0.227

Notes to Table 5AA:

(1) This Table represents stringent criteria. Use of the System Performance Path (Standard 90.1 ENVSTD 23 or ENVSTD24 Envelope Software) can produce criteria that are substantially less stringent, in some cases, and can provide greater compliance flexibility.

(2) Units for variables: U-Values - $W/(m^2 \cdot K)$ RSI-Values - $(m^2 \cdot K)/W$

Table 5A-1S
Simplified Alternate Component Packages for Location Number 345

Window-to-Wall Ratio	Shading Coefficient (SC)	Maximum Overall U-Value (U_o) for Fenestration, W/(m^2•K) (Btu/h•ft^2•F)	
		Heated and Cooled Building	Heated-only Building
≤ 0.20	≥ 0.80	4.20 (0.74)	4.03 (0.71)
	0.60 - 0.79	4.20 (0.74)	3.41 (0.60)
	0.40 - 0.59	4.20 (0.74)	2.73 (0.48)
	0.20 - 0.39	4.20 (0.74)	2.04 (0.36)
	0.00 - 0.19	4.20 (0.74)	1.25 (0.22)
0.21 - 0.40	≥ 0.80	NA	3.35 (0.59)
	0.60 - 0.79	NA	2.84 (0.50)
	0.40 - 0.59	1.87 (0.33)	2.27 (0.40)
	0.20 - 0.39	2.84 (0.50)	1.65 (0.29)
	0.00 - 0.19	3.41 (0.60)	0.91 (0.16)
0.41 - 0.60	≥ 0.80	NA	2.95 (0.52)
	0.60 - 0.79	NA	2.56 (0.45)
	0.40 - 0.59	NA	2.10 (0.37)
	0.20 - 0.39	1.48 (0.26)	1.48 (0.26)
	0.00 - 0.19	2.27 (0.40)	0.74 (0.13)

Opaque Envelope Component			Maximum Overall U-Value, W/(m^2•K) (Btu/h•ft^2•F)
Opaque wall	Heat Capacity, kJ/(m^2•K)	(Btu/(ft^2•F)	
	HC < 204	HC < 10	0.449 (0.079)
	204 ≤ HC < 307	10 ≤ HC < 15	0.483 (0.085)
	HC ≥ 307	HC ≥ 15	0.511 (0.090)
Roof			0.278 (0.049)
Wall adjacent to unconditioned space			0.68 (0.120)
Floor over unconditioned space			0.250 (0.044)

Opaque Envelope Component			Minimum RSI-Value, m^2•K/W (ft^2•h•F/Btu)
Wall below grade			1.76 (10)
Unheated slab on grade	Insulation Position	Length, m (in.)	
	Horizontal	0.6 (24)	3.17 (18)
		0.9 (36)	2.64 (15)
		1.2 (48)	1.94 (11)
	Vertical	0.6 (24)	1.41 (8)
		0.9 (36)	1.06 (6)
		1.2 (48)	0.70 (4)
Heated slab on grade	Insulation Position	Length, m (in.)	
	Horizontal	0.6 (24)	3.52 (20)
		0.9 (36)	2.99 (17)
		1.2 (48)	2.29 (13)
	Vertical	0.6 (24)	1.76 (10)
		0.9 (36)	1.41 (8)
		1.2 (48)	1.06 (6)

Table 5A-2S
Simplified Alternate Component Packages for Location Number 281, 333

Window-to-Wall Ratio	Shading Coefficient (SC)	Maximum Overall U-Value (U$_o$) for Fenestration, W/(m^2•K) (Btu/h•ft^2•F)	
		Heated and Cooled Building	Heated-only Building
≤ 0.20	≥ 0.80	4.20 (0.74)	3.63 (0.64)
	0.60 - 0.79	4.20 (0.74)	3.01 (0.53)
	0.40 - 0.59	4.20 (0.74)	2.38 (0.42)
	0.20 - 0.39	4.20 (0.74)	1.76 (0.31)
	0.00 - 0.19	4.20 (0.74)	1.02 (0.18)
0.21 - 0.40	≥ 0.80	NA	3.01 (0.53)
	0.60 - 0.79	NA	2.56 (0.45)
	0.40 - 0.59	2.10 (0.37)	2.04 (0.36)
	0.20 - 0.39	2.61 (0.46)	1.42 (0.25)
	0.00 - 0.19	2.95 (0.51)	0.74 (0.13)
0.41 - 0.60	≥ 0.80	NA	2.67 (0.47)
	0.60 - 0.79	NA	2.33 (0.41)
	0.40 - 0.59	NA	1.87 (0.33)
	0.20 - 0.39	1.59 (0.28)	1.31 (0.23)
	0.00 - 0.19	2.04 (0.36)	0.62 (0.11)

Opaque Envelope Component			Maximum Overall U-Value, W/(m^2•K) (Btu/h•ft^2•F)
	Heat Capacity, kJ/(m^2•K)	(Btu/(ft^2•F)	
Opaque wall	HC < 204	HC < 10	0.426 (0.075)
	204 HC < 307	10 HC < 15	0.466 (0.082)
	HC ≥ 307	HC ≥ 15	0.494 (0.087)
Roof			0.278 (0.049)
Wall adjacent to unconditioned space			0.62 (0.11)
Floor over unconditioned space			0.227 (0.040)

Opaque Envelope Component			Minimum RSI-Value, m^2•K/W (ft^2•h•F/Btu)
Wall below grade			1.94 (11)
Unheated slab on grade	Insulation Position	Length, m (in.)	
	Horizontal	0.6 (24)	3.17 (18)
		0.9 (36)	2.64 (15)
		1.2 (48)	1.94 (11)
	Vertical	0.6 (24)	1.41 (8)
		0.9 (36)	1.06 (6)
		1.2 (48)	0.70 (4)
Heated slab on grade	Insulation Position	Length, m (in.)	
	Horizontal	0.6 (24)	3.52 (20)
		0.9 (36)	2.99 (17)
		1.2 (48)	2.29 (13)
	Vetical	0.6 (24)	1.76 (10)
		0.9 (36)	1.41 (8)
		1.2 (48)	1.06 (6)

Table 5A-3S
Simplified Alternate Component Packages for Location Number 270, 287, 292, 334, 343

Window-to-Wall Ratio	Shading Coefficient (SC)	Maximum Overall U-Value (U_o) for Fenestration, W/(m^2•K) (Btu/h•ft^2•F)	
		Heated and Cooled Building	Heated-only Building
0.20	0.80	4.20 (0.74)	3.58 (0.63)
	0.60 - 0.79	4.20 (0.74)	3.01 (0.53)
	0.40 - 0.59	4.20 (0.74)	2.38 (0.42)
	0.20 - 0.39	4.20 (0.74)	1.76 (0.31)
	0.00 - 0.19	4.20 (0.74)	1.02 (0.18)
0.21 - 0.40	0.80	NA	2.95 (0.52)
	0.60 - 0.79	NA	2.50 (0.44)
	0.40 - 0.59	2.27 (0.40)	1.99 (0.35)
	0.20 - 0.39	2.56 (0.45)	1.42 (0.25)
	0.00 - 0.19	2.67 (0.47)	0.68 (0.12)
0.41 - 0.60	0.80	NA	2.56 (0.45)
	0.60 - 0.79	NA	2.21 (0.39)
	0.40 - 0.59	NA	1.82 (0.32)
	0.20 - 0.39	1.65 (0.29)	1.25 (0.22)
	0.00 - 0.19	1.87 (0.33)	0.62 (0.11)

Opaque Envelope Component			Maximum Overall U-Value, W/(m^2•K) (Btu/h•ft^2•F)
	Heat Capacity, kJ/(m^2•K)	(Btu/(ft^2•F)	
Opaque wall	HC < 204	HC < 10	0.360 (0.067)
	204 HC < 307	10 HC < 15	0.409 (0.072)
	HC 307	HC 15	0.432 (0.076)
Roof			0.256 (0.045)
Wall adjacent to unconditioned space			0.620 (0.110)
Floor over unconditioned space			0.221 (0.039)

Opaque Envelope Component			Minimum RSI-Value, m^2•K/W (ft^2•h•F/Btu)
Wall below grade			2.11 (12)
Unheated slab on grade	Insulation Position	Length, m (in.)	
	Horizontal	0.6 (24)	3.17 (18)
		0.9 (36)	2.64 (15)
		1.2 (48)	1.94 (11)
	Vertical	0.6 (24)	1.41 (8)
		0.9 (36)	1.06 (6)
		1.2 (48)	0.70 (4)
Heated slab on grade	Insulation Position	Length, m (in.)	
	Horizontal	0.6 (24)	3.52 (20)
		0.9 (36)	2.99 (17)
		1.2 (48)	2.29 (13)
	Vertical	0.6 (24)	1.76 (10)
		0.9 (36)	1.41 (8)
		1.2 (48)	1.06 (6)

Table 5A-4S
Simplified Alternate Component Packages for Location Number 291, 314, 323, 330

Window-to-Wall Ratio	Shading Coefficient (SC)	Maximum Overall U-Value (U_o) for Fenestration W/(m²•K) (Btu/h•ft²•F)	
		Heated and Cooled Building	Heated-only Building
≤ 0.20	0.80	4.20 (0.74)	3.58 (0.63)
	0.60 - 0.79	4.20 (0.74)	3.01 (0.53)
	0.40 - 0.59	4.20 (0.74)	2.44 (0.43)
	0.20 - 0.39	4.20 (0.74)	1.87 (0.33)
	0.00 - 0.19	4.20 (0.74)	1.14 (0.20)
0.21 - 0.40	0.80	NA	2.90 (0.51)
	0.60 - 0.79	2.04 (0.36)	2.44 (0.43)
	0.40 - 0.59	2.33 (0.41)	1.99 (0.35)
	0.20 - 0.39	2.44 (0.43)	1.42 (0.25)
	0.00 - 0.19	2.44 (0.43)	0.74 (0.13)
0.41 - 0.60	0.80	NA	2.50 (0.44)
	0.60 - 0.79	NA	2.16 (0.38)
	0.40 - 0.59	1.31 (0.23)	1.76 (0.31)
	0.20 - 0.39	1.70 (0.30)	1.25 (0.22)
	0.00 - 0.19	1.76 (0.31)	0.62 (0.11)

Opaque Envelope Component			Maximum Overall U-Value W/(m²•K) (Btu/h•ft²•F)
Opaque wall	Heat Capacity kJ/(m²•K)	(Btu/(ft²•F)	
	HC < 204	HC < 10	0.335 (0.059)
	204 ≤ HC < 307	10 HC < 15	0.352 (0.062)
	HC ≥ 307	HC 15	0.363 (0.064)
Roof			0.227 (0.040)
Wall adjacent to unconditioned space			0.570 (0.100)
Floor over unconditioned space			0.221 (0.039)

Opaque Envelope Component			Minimum RSI-Value m²•K/W (ft²•h•F/Btu)
Wall below grade			2.29 (13)
Unheated slab on grade	Insulation Position	Length m (in.)	
	Horizontal	0.6 (24)	3.17 (18)
		0.9 (36)	2.64 (15)
		1.2 (48)	1.94 (11)
	Vertical	0.6 (24)	1.41 (8)
		0.9 (36)	1.06 (6)
		1.2 (48)	0.70 (4)
Heated slab on grade	Insulation Position	Length m (in.)	
	Horizontal	0.6 (24)	3.52 (20)
		0.9 (36)	2.99 (17)
		1.2 (48)	2.29 (13)
	Vertical	0.6 (24)	1.76 (10)
		0.9 (36)	1.41 (8)
		1.2 (48)	1.06 (6)

Table 5A-5S
Simplified Alternate Component Packages for Location Number 236, 241, 260, 277, 278, 319, 331

Window-to-Wall Ratio	Shading Coefficient (SC)	Maximum Overall U-Value (U_o) for Fenestration, W/(m²•K) (Btu/h•ft²•F)	
		Heated and Cooled Building	Heated-only Building
0.20	0.80	4.20 (0.74)	3.80 (0.67)
	0.60 - 0.79	4.20 (0.74)	3.29 (0.58)
	0.40 - 0.59	4.20 (0.74)	2.78 (0.49)
	0.20 - 0.39	4.20 (0.74)	2.21 (0.39)
	0.00 - 0.19	4.20 (0.74)	1.53 (0.27)
0.21 - 0.40	0.80	1.76 (0.31)	2.90 (0.51)
	0.60 - 0.79	2.21 (0.39)	2.50 (0.44)
	0.40 - 0.59	2.38 (0.42)	2.04 (0.36)
	0.20 - 0.39	2.44 (0.43)	1.53 (0.27)
	0.00 - 0.19	2.38 (0.42)	0.91 (0.16)
0.41 - 0.60	0.80	NA	2.38 (0.42)
	0.60 - 0.79	NA	2.16 (0.38)
	0.40 - 0.59	1.48 (0.26)	1.76 (0.31)
	0.20 - 0.39	1.70 (0.30)	1.31 (0.23)
	0.00 - 0.19	1.70 (0.30)	0.68 (0.12)

Opaque Envelope Component			Maximum Overall U-Value, W/(m²•K) (Btu/h•ft²•F)
Opaque wall	Heat Capacity		
	kJ/(m²•K)	(Btu/ft²•F)	
	HC < 204	HC < 10	0.261 (0.046)
	204 HC < 307	10 HC < 15	0.261 (0.046)
	HC 307	HC 15	0.267 (0.047)
Roof			0.176 (0.031)
Wall adjacent to unconditioned space			0.494 (0.087)
Floor over unconditioned space			0.227 (0.039)

Opaque Envelope Component			Minimum RSI-Value, m²•K/W (ft²•h•F/Btu)
Wall below grade			2.82 (16)
Unheated slab on grade	Insulation Position	Length, m (in.)	
	Horizontal	0.6 (24)	3.17 (18)
		0.9 (36)	2.64 (15)
		1.2 (48)	1.94 (11)
	Vertical	0.6 (24)	1.41 (8)
		0.9 (36)	1.06 (6)
		1.2 (48)	0.70 (4)
Heated slab on grade	Insulation Position	Length, m (in.)	
	Horizontal	0.6 (24)	3.52 (20)
		0.9 (36)	2.99 (17)
		1.2 (48)	2.29 (13)
	Vertical	0.6 (24)	1.76 (10)
		0.9 (36)	1.41 (8)
		1.2 (48)	1.06 (6)

Table 5A-1(1)(3)(4)
Alternate Component Packages for Location Number 345 (Imperial Units)
HDD50 = 3201-4000, CDD65 = 501-1150, VSEW = 560-845

Design Parameters			Maximum Percent Fenestration					
			Fenestration U-Value (Uof)					
			Base Case			Perimeter Daylighting(2)		
						VLT < SC		VLT ≥ SC
Internal Load Density (ILD) Range	Projection Factor (PF) Range	Shading Coefficient (SCx) Range	0.59 to 0.53	0.52 to 0.40	0.39 to 0.00	0.59 to 0.53	0.52 to 0.40	0.39 to 0.00
0.00 - 1.50	0.00 - 0.25	1.00 - 0.72	21	22	23	22	23	25
		0.71 - 0.61	24	25	28	25	26	30
		0.60 - 0.51	27	28	32	27	29	34
		0.50 - 0.39	29	32	36	30	33	38
		0.38 - 0.26	32	36	43	32	36	45
		0.25 - 0.00	35	40	53	34	39	52
	0.26 - 0.50	1.00 - 0.72	28	29	33	29	31	35
		0.71 - 0.61	31	33	38	31	34	41
		0.60 - 0.51	33	36	43	33	37	45
		0.50 - 0.39	35	39	48	34	38	50
		0.38 - 0.00	36	41	55	35	40	54
	0.51 +	1.00 - 0.72	33	36	41	32	36	44
		0.71 - 0.61	35	39	47	34	39	50
		0.60 - 0.51	36	41	52	35	40	54
		0.50 - 0.00	37	43	56	36	41	56
1.51 - 3.00	0.00 - 0.25	1.00 - 0.72	16	18	19	22	23	25
		0.71 - 0.61	21	21	23	25	26	30
		0.60 - 0.51	23	24	26	26	30	34
		0.50 - 0.39	26	28	31	31	33	39
		0.38 - 0.26	31	33	38	33	37	47
		0.25 - 0.00	36	40	49	37	42	54
	0.26 - 0.50	1.00 - 0.72	24	25	27	29	30	36
		0.71 - 0.61	27	29	32	32	34	41
		0.60 - 0.51	30	32	36	34	37	46
		0.50 - 0.39	33	36	41	35	39	51
		0.38 - 0.00	37	41	49	37	42	56
	0.51 +	1.00 - 0.72	29	31	34	33	36	45
		0.71 - 0.61	32	35	40	35	39	51
		0.60 - 0.51	35	38	45	37	41	55
		0.50 - 0.00	37	41	50	38	43	57
3.01 - 3.50	0.00 - 0.25	1.00 - 0.72	16	16	17	21	22	25
		0.71 - 0.61	18	19	20	24	26	29
		0.60 - 0.51	21	22	23	27	29	34
		0.50 - 0.39	24	25	27	30	32	38
		0.38 - 0.26	28	30	34	33	37	46
		0.25 - 0.00	35	38	45	37	41	52
	0.26 - 0.50	1.00 - 0.72	21	22	23	28	29	35
		0.71 - 0.61	24	26	28	31	33	40
		0.60 - 0.51	27	29	32	33	36	45
		0.50 - 0.39	30	32	37	35	39	50
		0.38 - 0.00	35	38	44	37	42	56
	0.51 +	1.00 - 0.72	26	27	30	32	35	44
		0.71 - 0.61	29	31	35	35	38	50
		0.60 - 0.51	32	35	40	36	40	54
		0.50 - 0.00	35	38	45	37	42	57

Maximum Wall U-value (Uow) Light-weight Walls		
ILD Range 0.00 - 3.50		
Percent Fenestration	HC Range	All Insulation Positions
0 - 100	0.0 - 4.9	0.076

Maximum Wall U-value (Uow) Mass Walls			
ILD Range 0.00 - 1.50			
Percent Fenestration	HC Range	Interior Insulation	Exterior Insulation
21	5.0 - 9.9	0.079	0.10
	10.0 - 14.9	0.085	0.11
	15.0 +	0.090	0.11
56	5.0 - 9.9	0.079	0.09
	10.0 - 14.9	0.084	0.10
	15.0 +	0.087	0.11
ILD Range 1.51 - 3.00			
Percent Fenestration	HC Range	Interior Insulation	Exterior Insulation
16	5.0 - 9.9	0.080	0.10
	10.0 - 14.9	0.087	0.12
	15.0 +	0.094	0.12
56	5.0 - 9.9	0.079	0.09
	10.0 - 14.9	0.084	0.10
	15.0 +	0.087	0.11
ILD Range 3.01 - 3.50			
Percent Fenestration	HC Range	Interior Insulation	Exterior Insulation
16	5.0 - 9.9	0.080	0.10
	10.0 - 14.9	0.088	0.12
	15.0 +	0.095	0.12
57	5.0 - 9.9	0.079	0.09
	10.0 - 14.9	0.084	0.10
	15.0 +	0.088	0.11

Notes to Table 5A-1:

(1) See Table 5AA for other envelope criteria to Table 5A-1.

(2) Perimeter daylighting must use daylight sensing controls.

(3) This Table represents stringent criteria. Use of the System Performance Path (Standard 90.1 ENVSTD 23 or ENVSTD24 Envelope Software) can produce criteria that are substantially less stringent, in some cases, and can provide greater compliance flexibility.

(4) Units for variables: U-Values - Btu/(hr·ft²·F) ILD - W/ft² HC - Btu/(ft²·F)

Table 5A-2(1)(3)(4)
Alternate Component Packages for Location Number 281, 333 (Imperial Units)
HDD50 = 3201-4000, CDD65 = 0-500, VSEW = 560-845

Design Parameters			Maximum Percent Fenestration				
			Fenestration U-Value (Uof)				
Internal Load Density (ILD) Range	Projection Factor (PF) Range	Shading Coefficient (SCx) Range	Base Case			Perimeter Daylighting(2)	
			0.59 to 0.53	0.52 to 0.40	0.39 to 0.00	VLT < SC	VLT ≥ SC
						N/A	N/A
0.00 - 1.50	0.00 - 0.25	1.00 - 0.72	26	29	30		
		0.71 - 0.61	29	33	36		
		0.60 - 0.51	31	37	42		
		0.50 - 0.39	33	41	47		
		0.38 - 0.26	34	46	56		
		0.25 - 0.00	34	49	66		
	0.26 - 0.50	1.00 - 0.72	33	39	43		
		0.71 - 0.61	35	44	50		
		0.60 - 0.51	36	48	56		
		0.50 - 0.39	36	50	63		
		0.38 - 0.00	36	52	70		
	0.51 +	1.00 - 0.72	37	47	54		
		0.71 - 0.61	38	51	62		
		0.60 - 0.51	38	53	68		
		0.50 - 0.00	38	54	73		
1.51 - 3.00	0.00 - 0.25	1.00 - 0.72	22	24	25		
		0.71 - 0.61	26	28	30		
		0.60 - 0.51	28	32	35		
		0.50 - 0.39	31	36	40		
		0.38 - 0.26	34	43	50		
		0.25 - 0.00	38	50	63		
	0.26 - 0.50	1.00 - 0.72	29	33	35		
		0.71 - 0.61	32	38	42		
		0.60 - 0.51	35	42	48		
		0.50 - 0.39	37	46	54		
		0.38 - 0.00	39	51	64		
	0.51 +	1.00 - 0.72	34	41	45		
		0.71 - 0.61	37	46	53		
		0.60 - 0.51	38	50	59		
		0.50 - 0.00	40	53	66		
3.01 - 3.50	0.00 - 0.25	1.00 - 0.72	20	22	22		
		0.71 - 0.61	23	26	27		
		0.60 - 0.51	26	29	31		
		0.50 - 0.39	29	33	37		
		0.38 - 0.26	33	40	45		
		0.25 - 0.00	37	48	59		
	0.26 - 0.50	1.00 - 0.72	27	30	32		
		0.71 - 0.61	30	35	38		
		0.60 - 0.51	33	39	43		
		0.50 - 0.39	35	43	49		
		0.38 - 0.00	38	49	59		
	0.51 +	1.00 - 0.72	32	37	41		
		0.71 - 0.61	36	42	48		
		0.60 - 0.51	37	46	54		
		0.50 - 0.00	39	50	61		

Maximum Wall U-value (Uow) Light-weight Walls		
ILD Range 0.00 - 3.50		
Percent Fenestration	HC Range	All Insulation Positions
0 - 100	0.0 - 4.9	0.072

Maximum Wall U-value (Uow) Mass Walls			
ILD Range 0.00 - 1.50			
Percent Fenestration	HC Range	Interior Insulation	Exterior Insulation
26	5.0 - 9.9	0.075	0.10
	10.0 - 14.9	0.082	0.11
	15.0 +	0.087	0.12
73	5.0 - 9.9	0.075	0.09
	10.0 - 14.9	0.080	0.11
	15.0 +	0.086	0.11
ILD Range 1.51 - 3.00			
Percent Fenestration	HC Range	Interior Insulation	Exterior Insulation
22	5.0 - 9.9	0.076	0.10
	10.0 - 14.9	0.084	0.12
	15.0 +	0.091	0.13
66	5.0 - 9.9	0.075	0.10
	10.0 - 14.9	0.082	0.12
	15.0 +	0.089	0.12
ILD Range 3.01 - 3.50			
Percent Fenestration	HC Range	Interior Insulation	Exterior Insulation
20	5.0 - 9.9	0.076	0.10
	10.0 - 14.9	0.085	0.12
	15.0 +	0.092	0.13
60	5.0 - 9.9	0.075	0.10
	10.0 - 14.9	0.083	0.12
	15.0 +	0.090	0.12

Notes to Table 5A-2:

(1) See Table 5AA for other envelope criteria to Table 5A-2.

(2) Perimeter daylighting must use daylight sensing controls.

(3) This Table represents stringent criteria. Use of the System Performance Path (Standard 90.1 ENVSTD 23 or ENVSTD24 Envelope Software) can produce criteria that are substantially less stringent, in some cases, and can provide greater compliance flexibility.

(4) Units for variables: U-Values - Btu/(hr·ft^2·F) ILD - W/ft^2 HC - Btu/(ft^2·F)

Table 5A-3(1)(3)(4)
Alternate Component Packages for Location Number 270, 287, 292, 334, 343 (Imperial Units)
HDD50 = 4001-5000, CDD65 = 0-1150, VSEW = 560-845

Design Parameters			**Maximum Percent Fenestration**				
			Fenestration U-Value (Uof)				
			Base Case			Perimeter Daylighting(2)	
Internal Load Density (ILD) Range	Projection Factor (PF) Range	Shading Coefficient (SCx) Range				V.L.T < SC	V.L.T SC
			0.52 to 0.40	0.39 to 0.31	0.30 to 0.00	N/A	N/A
0.00 - 1.50	0.00 - 0.25	1.00 - 0.72	23	25	26		
		0.71 - 0.61	26	29	31		
		0.60 - 0.51	28	33	36		
		0.50 - 0.39	31	37	42		
		0.38 - 0.26	30	43	51		
		0.25 - 0.00	29	42	60		
	0.26 - 0.50	1.00 - 0.72	30	34	37		
		0.71 - 0.61	33	39	44		
		0.60 - 0.51	33	43	50		
		0.50 - 0.39	32	48	56		
		0.38 - 0.00	31	46	66		
	0.51 +	1.00 - 0.72	35	42	48		
		0.71 - 0.61	34	47	55		
		0.60 - 0.51	33	50	62		
		0.50 - 0.00	32	48	68		
1.51 - 3.00	0.00 - 0.25	1.00 - 0.72	19	20	21		
		0.71 - 0.61	22	24	25		
		0.60 - 0.51	25	28	30		
		0.50 - 0.39	28	32	35		
		0.38 - 0.26	32	38	43		
		0.25 - 0.00	33	45	57		
	0.26 - 0.50	1.00 - 0.72	26	28	30		
		0.71 - 0.61	29	33	36		
		0.60 - 0.51	32	37	41		
		0.50 - 0.39	34	42	47		
		0.38 - 0.00	34	47	57		
	0.51 +	1.00 - 0.72	31	35	39		
		0.71 - 0.61	34	41	46		
		0.60 - 0.51	35	45	52		
		0.50 - 0.00	35	49	58		
3.01 - 3.50	0.00 - 0.25	1.00 - 0.72	17	18	19		
		0.71 - 0.61	20	22	23		
		0.60 - 0.51	23	25	26		
		0.50 - 0.39	26	29	31		
		0.38 - 0.26	30	35	39		
		0.25 - 0.00	33	45	53		
	0.26 - 0.50	1.00 - 0.72	23	25	27		
		0.71 - 0.61	26	30	32		
		0.60 - 0.51	29	34	37		
		0.50 - 0.39	32	38	43		
		0.38 - 0.00	34	45	52		
	0.51 +	1.00 - 0.72	28	32	34		
		0.71 - 0.61	32	37	41		
		0.60 - 0.51	34	41	46		
		0.50 - 0.00	35	45	53		

Maximum Wall U-Value (Uow) Light-weight Walls		
ILD Range 0.00 - 3.50		
Percent Fenestration	HC Range	All Insulation Positions
0 - 100	0.0 - 4.9	0.066

Maximum Wall U-Value (Uow) Mass Walls			
ILD Range 0.00 - 1.50			
Percent Fenestration	HC Range	Interior Insulation	Exterior Insulation
23	5.0 - 9.9	0.067	0.086
	10.0 - 14.9	0.072	0.096
	15.0 +	0.076	0.100
68	5.0 - 9.9	0.067	0.083
	10.0 - 14.9	0.071	0.094
	15.0 +	0.075	0.097
ILD Range 1.51 - 3.00			
Percent Fenestration	HC Range	Interior Insulation	Exterior Insulation
19	5.0 - 9.9	0.068	0.089
	10.0 - 14.9	0.073	0.100
	15.0 +	0.078	0.110
58	5.0 - 9.9	0.067	0.087
	10.0 - 14.9	0.072	0.099
	15.0 +	0.077	0.100
ILD Range 3.01 - 3.50			
Percent Fenestration	HC Range	Interior Insulation	Exterior Insulation
17	5.0 - 9.9	0.068	0.090
	10.0 - 14.9	0.074	0.100
	15.0 +	0.079	0.110
53	5.0 - 9.9	0.067	0.088
	10.0 - 14.9	0.073	0.100
	15.0 +	0.077	0.110

Notes to Table 5A-3:

(1) See Table 5AA for other envelope criteria to Table 5A-3.

(2) Perimeter daylighting must use daylight sensing controls.

(3) This Table represents stringent criteria. Use of the System Performance Path (Standard 90.1 ENVSTD 23 or ENVSTD24 Envelope Software) can produce criteria that are substantially less stringent in some cases, and can provide greater compliance flexibility.

(4) Units for variables: U-Values - Btu/(hr•ft^2•F) ILD - W/ft^2 HC - Btu/(ft^2•F)

Table 5A-4(1)(3)(4)
Alternate Component Packages for Location Number 291, 314, 323, 330 (Imperial Units)
HDD50 = 5001-6500, CDD65 = 0-1150, VSEW = 560-845

Design Parameters			**Maximum Percent Fenestration**				
			Fenestration U-Value (Uof)				
Internal Load Density (ILD) Range	Projection Factor (PF) Range	Shading Coefficient (SCx) Range	Base Case			Perimeter Daylighting(2)	
						VLT < SC	VLT ≥ SC
			0.52 to 0.40	0.39 to 0.31	0.30 to 0.00	N/A	N/A
0.00 - 1.50	0.00 - 0.25	1.00 - 0.72	26	30	33		
		0.71 - 0.61	29	35	39		
		0.60 - 0.51	30	36	44		
		0.50 - 0.39	31	41	49		
		0.38 - 0.26	30	43	56		
		0.25 - 0.00	29	42	59		
	0.26 - 0.50	1.00 - 0.72	32	40	46		
		0.71 - 0.61	33	44	52		
		0.60 - 0.51	32	46	57		
		0.50 - 0.39	32	46	61		
		0.38 - 0.00	31	45	64		
	0.51 +	1.00 - 0.72	34	40	58		
		0.71 - 0.61	33	46	62		
		0.60 - 0.51	32	47	66		
		0.50 - 0.00	32	46	66		
1.51 - 3.00	0.00 - 0.25	1.00 - 0.72	23	25	27		
		0.71 - 0.61	25	29	32		
		0.60 - 0.51	28	33	36		
		0.50 - 0.39	30	36	42		
		0.38 - 0.26	31	41	49		
		0.25 - 0.00	32	44	59		
	0.26 - 0.50	1.00 - 0.72	29	34	37		
		0.71 - 0.61	31	38	43		
		0.60 - 0.51	32	41	48		
		0.50 - 0.39	32	44	53		
		0.38 - 0.00	33	45	61		
	0.51 +	1.00 - 0.72	32	40	46		
		0.71 - 0.61	33	44	52		
		0.60 - 0.51	33	46	57		
		0.50 - 0.00	33	46	62		
3.01 - 3.50	0.00 - 0.25	1.00 - 0.72	21	23	24		
		0.71 - 0.61	24	27	29		
		0.60 - 0.51	26	30	34		
		0.50 - 0.39	29	34	38		
		0.38 - 0.26	31	39	46		
		0.25 - 0.00	33	45	57		
	0.26 - 0.50	1.00 - 0.72	27	31	34		
		0.71 - 0.61	29	35	40		
		0.60 - 0.51	32	38	45		
		0.50 - 0.39	33	42	50		
		0.38 - 0.00	34	46	57		
	0.51 +	1.00 - 0.72	31	37	43		
		0.71 - 0.61	33	41	49		
		0.60 - 0.51	34	44	53		
		0.50 - 0.00	34	47	56		

Maximum Wall U-value (Uow) Light-weight Walls		
ILD Range 0.00 - 3.50		
Percent Fenestration	HC Range	All Insulation Positions
0 - 100	0.0 - 4.9	0.058

Maximum Wall U-value (Uow) Mass Walls			
ILD Range 0.00 - 1.50			
Percent Fenestration	HC Range	Interior Insulation	Exterior Insulation
26	5.0 - 9.9	0.059	0.071
	10.0 - 14.9	0.062	0.078
	15.0 +	0.064	0.080
66	5.0 - 9.9	0.059	0.071
	10.0 - 14.9	0.062	0.077
	15.0 +	0.064	0.079
ILD Range 1.51 - 3.00			
Percent Fenestration	HC Range	Interior Insulation	Exterior Insulation
23	5.0 - 9.9	0.059	0.073
	10.0 - 14.9	0.062	0.080
	15.0 +	0.065	0.083
62	5.0 - 9.9	0.059	0.072
	10.0 - 14.9	0.062	0.079
	15.0 +	0.064	0.081
ILD Range 3.01 - 3.50			
Percent Fenestration	HC Range	Interior Insulation	Exterior Insulation
21	5.0 - 9.9	0.060	0.073
	10.0 - 14.9	0.063	0.081
	15.0 +	0.065	0.083
58	5.0 - 9.9	0.059	0.072
	10.0 - 14.9	0.062	0.080
	15.0 +	0.065	0.082

Notes to Table 5A-4:

(1) See Table 5AA for other envelope criteria to Table 5A-4.

(2) Perimeter daylighting must use daylight sensing controls.

(3) This Table represents stringent criteria. Use of the System Performance Path (Standard 90.1 ENVSTD 23 or ENVSTD24 Envelope Software) can produce criteria that are substantially less stringent, in some cases, and can provide greater compliance flexibility.

(4) Units for variables: U-Values - Btu/(hr·ft²·F) ILD - W/ft² HC - Btu/(ft²·F)

Table 5A-5(1)(3)(4)
Alternate Component Packages for Location No. 236, 241, 260, 277, 278, 319, 331 (Imperial Units)
HDD50 > 6500, CDD65 < 100, VSEW < 560

Design Parameters			**Maximum Percent Fenestration**				
			Fenestration U-Value (Uof)				
Internal Load Density (ILD) Range	Projection Factor (PF) Range	Shading Coefficient (SCx) Range	Base Case			Perimeter Daylighting(2)	
						VLT < SC	VLT ≥ SC
			0.52 to 0.40	0.39 to 0.31	0.30 to 0.00	N/A	N/A
0.00 - 1.50	0.00 - 0.25	1.00 - 0.72	30	40	50		
		0.71 - 0.61	29	42	54		
		0.60 - 0.51	27	42	56		
		0.50 - 0.39	25	39	57		
		0.38 - 0.26	24	36	54		
		0.25 - 0.00	21	32	48		
	0.26 - 0.50	1.00 - 0.72	29	44	58		
		0.71 - 0.61	27	42	60		
		0.60 - 0.51	26	40	60		
		0.50 - 0.39	24	37	57		
		0.38 - 0.00	23	34	52		
	0.51 -	1.00 - 0.72	27	43	62		
		0.71 - 0.61	25	40	61		
		0.60 - 0.51	24	37	57		
		0.50 - 0.00	23	31	53		
1.51 - 3.00	0.00 - 0.25	1.00 - 0.72	27	35	42		
		0.71 - 0.61	27	37	47		
		0.60 - 0.51	27	38	49		
		0.50 - 0.39	26	38	52		
		0.38 - 0.26	25	36	52		
		0.25 - 0.00	24	34	49		
	0.26 - 0.50	1.00 - 0.72	28	40	51		
		0.71 - 0.61	27	40	53		
		0.60 - 0.51	26	39	55		
		0.50 - 0.39	25	37	54		
		0.38 - 0.00	24	36	52		
	0.51 -	1.00 - 0.72	27	40	55		
		0.71 - 0.61	26	39	56		
		0.60 - 0.51	25	38	55		
		0.50 - 0.00	25	36	53		
3.01 - 3.50	0.00 - 0.25	1.00 - 0.72	28	36	43		
		0.71 - 0.61	29	38	47		
		0.60 - 0.51	30	40	50		
		0.50 - 0.39	29	41	53		
		0.38 - 0.26	28	41	56		
		0.25 - 0.00	27	39	55		
	0.26 - 0.50	1.00 - 0.72	31	41	51		
		0.71 - 0.61	30	42	55		
		0.60 - 0.51	30	43	57		
		0.50 - 0.39	29	42	58		
		0.38 - 0.00	28	40	58		
	0.51 -	1.00 - 0.72	30	43	56		
		0.71 - 0.61	30	43	58		
		0.60 - 0.51	29	42	59		
		0.50 - 0.00	28	41	59		

Maximum Wall U-value (Uow) Light-weight Walls		
ILD Range: 0.00 - 3.50		
Percent Fenestration	HC Range	All Insulation Positions
0 - 100	0.0 - 4.9	0.045

Maximum Wall U-value (Uow) Mass Walls			
ILD Range: 0.00 - 1.50			
Percent Fenestration	HC Range	Interior Insulation	Exterior Insulation
21	5.0 - 9.9	0.046	0.051
	10.0 - 14.9	0.046	0.051
	15.0 +	0.047	0.051
62	5.0 - 9.9	0.046	0.054
	10.0 - 14.9	0.047	0.056
	15.0 +	0.048	0.056
ILD Range: 1.51 - 3.00			
Percent Fenestration	HC Range	Interior Insulation	Exterior Insulation
24	5.0 - 9.9	0.046	0.053
	10.0 - 14.9	0.047	0.054
	15.0 +	0.047	0.054
56	5.0 - 9.9	0.046	0.054
	10.0 - 14.9	0.047	0.055
	15.0 +	0.048	0.055
ILD Range: 3.01 - 3.50			
Percent Fenestration	HC Range	Interior Insulation	Exterior Insulation
27	5.0 - 9.9	0.046	0.054
	10.0 - 14.9	0.047	0.055
	15.0 +	0.047	0.054
59	5.0 - 9.9	0.046	0.054
	10.0 - 14.9	0.047	0.055
	15.0 +	0.048	0.055

Notes to Table 5A-5:

(1) See Table 5AA for other envelope criteria to Table 5A-5.

(2) Perimeter daylighting must use daylight sensing controls.

(3) This Table represents stringent criteria. Use of the System Performance Path (Standard 90.1 ENVSTD 23 or ENVSTD24 Envelope Software) can produce criteria that are substantially less stringent, in some cases, and can provide greater compliance flexibility.

(4) Units for variables: U-Values - $\mathrm{Btu/(hr \cdot ft^2 \cdot F)}$ ILD - $\mathrm{W/ft^2}$ HC - $\mathrm{Btu/(ft^2 \cdot F)}$

e_1

Table 5AA[1,2]
Other Envelope Criteria (Imperial Units)

Other Envelope Criteria for Table 5A-1					
Minimum R-Value				Maximum U-Value	
Wall below grade	10			Roof	0.049
Unheated slab on grade	24 in	36 in	48 in	Wall adjacent to unconditioned space	0.12
Horizontal installation	18	15	11		
Vertical installation	8	6	4	Floor over unconditioned space	0.044

Other Envelope Criteria for Table 5A-2					
Minimum R-Value				Maximum U-Value	
Wall below grade	11			Roof	0.049
Unheated slab on grade	24 in	36 in	48 in	Wall adjacent to unconditioned space	0.11
Horizontal installation	18	15	11		
Vertical installation	8	6	4	Floor over unconditioned space	0.04

Other Envelope Criteria for Table 5A-3					
Minimum R-Value				Maximum U-Value	
Wall below grade	12			Roof	0.045
Unheated slab on grade	24 in	36 in	48 in	Wall adjacent to unconditioned space	0.11
Horizontal installation	18	15	11		
Vertical installation	8	6	4	Floor over unconditioned space	0.039

Other Envelope Criteria for Table 5A-4					
Minimum R-Value				Maximum U-Value	
Wall below grade	13			Roof	0.04
Unheated slab on grade	24 in	36 in	48 in	Wall adjacent to unconditioned space	0.10
Horizontal installation	18	15	11		
Vertical installation	8	6	4	Floor over unconditioned space	0.039

Other Envelope Criteria for Table 5A-5					
Minimum R-Value				Maximum U-Value	
Wall below grade	16			Roof	0.031
Unheated slab on grade	24 in	36 in	48 in	Wall adjacent to unconditioned space	0.087
Horizontal installation	18	15	11		
Vertical installation	8	6	4	Floor over unconditioned space	0.04

Notes to Table 5AA:

(1) This Table represents stringent criteria. Use of the System Performance Path Standard 90.1 ENVSTD 23 or ENVSTD24 Envelope Software can produce criteria that are substantially less stringent, in some cases, and can provide greater compliance flexibility.

(2) Units for variables: U-Values - Btu/(hr·ft^2·F)   R-Values - (hr·ft^2·F)/Btu

Section 6 Heating, Ventilating, and Air Conditioning

6.2 Compliance Path(s)

6.2.1 is replaced with the following:

6.2.1 Compliance with Section 6 shall be achieved by meeting all requirements for 6.1, General; 6.4, Mandatory Provisions; 6.5, Prescriptive Path, 6.7, Submittals, and 6.8, Minimum Equipment Efficiency.

6.4 Mandatory Provisions

6.4.1.1 Minimum Equipment Efficiencies – Listed Equipment – Standard Rating and Operating Conditions is replaced with the following:

6.4.1.1 Minimum Equipment Efficiencies – Listed Equipment – Standard Rating and Operating Conditions. Equipment shown in Tables 6.8.1A to 6.8.1G shall have a minimum performance at the specified rating conditions when tested in accordance with the specified test procedure. The minimum efficiency values, test procedures and standards specified in the Ontario Energy Efficiency Act shall apply if provided. Otherwise, the minimum efficiency values, test procedures and standards specified in ANSI/ASHRAE/IESNA Standard 90.1 shall apply. Where multiple rating conditions or performance requirements are provided, the equipment shall satisfy all requirements, unless otherwise exempted by footnotes in the Table. Equipment regulated under the Ontario Energy Efficiency Act shall have no minimum efficiency requirements for operation at minimum capacity or other than standard rating conditions. Equipment used to provide water heating functions as part of a combination system shall satisfy all requirements for the appropriate space heating or cooling category.

Tables are as follows:
(a) Table 6.8.1A - Air Conditioners and Condensing Units
(b) Table 6.8.1B - Heat Pumps
(c) Table 6.8.1C - Water Chilling Packages (see 6.4.1.2 for water-cooled centrifugal water-chilling packages that are designed to operate at nonstandard conditions)
(d) Table 6.8.1D - Packaged Terminal and Room Air Conditioners and Heat Pumps
(e) Table 6.8.1E - Furnaces, Duct Furnaces, and Unit Heaters
(f) Table 6.8.1F – Boilers
(g) Table 6.8.1G - Heat Rejection Equipment

All furnaces with input ratings of ≥66 kW (≥225,000 Btu/h), including electric furnaces, that are not located within the conditioned space shall have jacket losses not exceeding 0.75% of the input rating.

6.4.1.4 Verification of Equipment Efficiencies is replaced with the following:

6.4.1.4 Verification of Equipment Efficiencies. Equipment efficiency information supplied by manufacturers shall be verified as follows:
(a) Equipment covered under the Ontario Energy Efficiency Act shall comply with the Ontario Ministry of Energy certification requirements.
(b) If a certification program exists for a covered product, and it includes provisions for verification and challenge of equipment efficiency ratings, then the product shall be listed in the certification program.
(c) if a certification program exists for a covered product, and it includes provisions for verification and challenge of equipment efficiency ratings, but the product is not listed in the existing certification program, the ratings shall be verified by an independent laboratory test report, or
(d) if no certification program exists for a covered product, the equipment efficiency ratings shall be supported by data furnished by the manufacturer, or

(e) where components such as indoor or outdoor coils from different manufacturers are used, the system designer shall specify component efficiencies whose combined efficiency meets the minimum equipment efficiency requirements in 6.4.1.

(f) Products covered in Table 6.8.1G shall have efficiency ratings supported by data furnished by the manufacturer.

6.4.1.5 Labelling

6.4.1.5.1 Mechanical Equipment is replaced with the following:

m, **6.4.1.5.1 Mechanical Equipment.** Mechanical equipment that is not regulated by the Ontario Energy Efficiency Act shall carry a permanent label installed by the manufacturer stating that the equipment complies with the requirements of ANSI/ASHRAE/IESNA Standard 90.1.

Equipment Ratings. Equipment ratings certified under a nationally recognized certification program or rating procedure or data furnished by the equipment manufacturer shall be acceptable to satisfy these requirements. The equipment efficiencies must be tested in accordance with the appropriate Reference Standards as listed in Tables 10-1 to 10-10 to be acceptable.

6.4.3.4 Heat Pump Auxiliary Heat Control

Exceptions to 6.4.3.4 replaced with the following:

Exceptions to 6.4.3.4: Heat pumps whose minimum efficiency is regulated by the Ontario Energy Efficiency Act and whose HSPF rating both meets the requirements shown in Table 6.8.1B and includes all usage of internal electric resistance heating.

6.8 Minimum Equipment Efficiency Tables

6.8.1 Minimum Efficiency Requirement Listed Equipment – Standard Rating and Operating Conditions

6.8.1 Tables 6.8.1A to 6.8.1G are replaced with the following:

Table 6.8.1A
Unitary Air Conditioners and Condensing Units, Electrically Operated, Minimum Efficiency Requirements

Equipment Type	Size Category	Sub-Category or Rating Condition	Minimum Efficiency	Test Procedure
Air Conditioners Air Cooled	< 19 kW (< 65,000 Btu/h)	Split System and Single Package	13.0 SEER	CAN/CSA-C656 ARI 210/240
	≥ 19 kW and < 40 kW (≥ 65,000 Btu/h and < 135,000 Btu/h)	Split System and Single Package	10.3 EER 10.6 IPLV	CAN/CSA-C746 ARI 340/360
	≥ 40 kW and < 70 kW (≥ 135,000 Btu/h and < 240,000 Btu/h)	Split System and Single Package	9.7 EER 9.9 IPLV	CAN/CSA-C746 ARI 340/360
	≥ 70 kW and < 223 kW (≥ 240,000 Btu/h and < 760,000 Btu/h)	Split System and Single Package	9.5 EER 9.7 IPLV	ARI 340/360
	≥ 223 kW (≥ 760,000 Btu/h)	Split System and Single Package	9.2 EER 9.4 IPLV	ARI 340/360
Through-the-Wall, Air Cooled	≤ 8.8 kW (≤ 30,000 Btu/h)	Split System and Single Package	10.9 SEER (before 1/23/2010) 12.0 SEER (as of 1/23/2010)	CAN/CSA-C656 ARI 210/240
Small-Duct High-Velocity, Air Cooled	< 19 kW (< 65,000 Btu/h)	Split System	11.0 SEER	CAN/CSA-C656 ARI 210/240
Air Conditioners Water and Evaporatively Cooled	< 19 kW (< 65,000 Btu/h)	Split System and Single Package	12.1 EER	ARI 210/240
	≥ 19 kW and < 40 kW (≥ 65,000 Btu/h and < 135,000 Btu/h)	Split System and Single Package	11.5 EER	CAN/CSA-C746 ARI 340/360
	≥ 40 kW and < 70 kW (≥ 135,000 Btu/h and < 240,000 Btu/h)	Split System and Single Package	11.0 EER	CAN/CSA-C746 ARI 340/360
	≥ 70 kW (≥ 240,000 Btu/h)	Split System and Single Package	11.0 EER 10.3 IPLV	ARI 340/360
Condensing Units, Air Cooled	≥ 40 kW (≥ 135,000 Btu/h)		10.1 EER 11.2 IPLV	CAN/CSA-C746 ARI 365
Condensing Units, Water or Evaporatively Cooled	≥ 40 kW (≥ 135,000 Btu/h)		13.1 EER 13.1 IPLV	CSA C746 ARI 365

Notes to Table 6.8.1A:

(1) IPLV's are only applicable to equipment with capacity modulation. For units with other than electric resistance heat deduct 0.2 EER and 0.2 IPLV.

(2) Minimum efficiency regulated by Ontario Energy Efficiency Act.

(3) Minimum efficiency specified in ANSI/ASHRAE/IESNA Standard 90.1.

Table 6.8.1B
Unitary and Applied Heat Pumps, Electrically Operated, Minimum Efficiency Requirements

Equipment Type	Size Category	Sub-Category or Rating Condition	Minimum Efficiency	Test Procedure
Air Cooled (Cooling Mode)	< 19 kW (< 65,000 Btu/h)	Split System and Single Package	13.0 SEER	CAN/CSA-C656 ARI 210/240
	≥ 19 kW and < 40 kW (≥ 65,000 Btu/h and < 135,000 Btu/h)	Split System and Single Package	10.1 EER 10.4 IPLV	CAN/CSA-C746 ARI 340/360
	≥ 40 kW and < 70 kW (≥ 135,000 Btu/h and < 240,000 Btu/h)	Split System and Single Package	9.3 EER 9.5 IPLV	CAN/CSA-C746 ARI 340/360
	≥ 70 kW (≥ 240,000 Btu/h)	Split System and Single Package	9.0 EER 9.2 IPLV	ARI 340/360
Through-the-Wall (Air Cooled, Cooling Mode)	≤ 8.8 kW (≤ 30,000 Btu/h)	Split System and Single Package	10.9 SEER (before 1/23/2010) 12.0 SEER (as of 1/23/2010)	CAN/CSA-C656 ARI 210/240
Small-Duct High-Velocity (Air Cooled, Cooling Mode)	< 19 kW (< 65,000 Btu/h)	Split System	11.0 SEER	CAN/CSA-C656 ARI 210/240
Water-Source (Cooling Mode)	< 5 kW (< 17,000 Btu/h)	30°C (86°F) Entering Water	3.28 COPc	CAN/CSA-C13256-1
	≥ 5 kW and < 19 kW (≥ 17,000 Btu/h and < 65,000 Btu/h)	30°C (86°F) Entering Water	3.52 COPc	CAN/CSA-C13256-1
	≥ 19 kW and < 40 kW (≥ 65,000 Btu/h and < 135,000 Btu/h)	30°C (86°F) Entering Water	3.52 COPc	CAN/CSA-C13256-1
Groundwater Source (Cooling Mode)	< 40 kW (< 135,000 Btu/h)	15°C (59°F) Entering Water	4.75 COPc	CAN/CSA-C13256-1
Ground Source (Cooling Mode)	< 40 kW (< 135,000 Btu/h)	25°C (77°F) Entering Water	3.93 COPc	CAN/CSA-C13256-1
Air Cooled (Heating Mode)	< 19 kW (< 65,000 Btu/h) Cooling Capacity	Split System and Single Package	6.7 HSPF V	CAN/CSA-C656 ARI 210/240
	≥ 19 kW and < 40 kW (≥ 65,000 Btu/h and < 135,000 Btu/h) Cooling Capacity	8.3°C db / 6.1°C wb (47°F db / 43°F wb) Outdoor Air	3.2 COP	CAN/CSA-C746 ARI 340/360
		-8.3°C db / -9.4°C wb (17°F db / 15°F wb) Outdoor Air	2.2 COP	
	≥ 40 kW (≥ 135,000 Btu/h) Cooling Capacity	8.3°C db / 6.1°C wb (47°F db / 43°F wb) Outdoor Air	3.1 COP	CAN/CSA-C746 ARI 340/360
		-8.3°C db / -9.4°C wb (17°F db / 15°F wb) Outdoor Air	2.0 COP	
Through-the-Wall (Air Cooled, Heating Mode)	≤ 8.8 kW (≤ 30,000 Btu/h) Cooling Capacity	Split System and Single Package	6.2 HSPF V (before 1/23/2010) 6.4 HSPF V (as of 1/23/2010)	CAN/CSA-C656 ARI 210/240
Small-Duct High-Velocity (Air Cooled, Heating Mode)	< 19 kW (< 65,000 Btu/h) Cooling Capacity	Split System	5.9 HSPF V	CAN/CSA-C656 ARI 210/240
Water-Source (Heating Mode)	< 40 kW (< 135,000 Btu/h) Cooling Capacity	20°C (68°F) Entering Water	4.2 COP	CAN/CSA-C13256-1
Groundwater Source (Heating Mode)	< 40 kW (< 135,000 Btu/h) Cooling Capacity	10°C (50°F) Entering Water	3.6 COP	CAN/CSA-C13256-1
Ground Source (Heating Mode)	< 40 kW (< 135,000 Btu/h) Cooling Capacity	0°C (32°F) Entering Water	3.1 COP	CAN/CSA-C13256-1

Notes to Table 6.8.1B:

(1) IPLVs are only applicable to equipment with capacity modulation.

(2) Minimum efficiency regulated by Ontario Energy Efficiency Act.

(3) Minimum efficiency specified in ANSI/ASHRAE/IESNA Standard 90.1.

Table 6.8.1C
Water Chilling Packages, Minimum Efficiency Requirements

Equipment Type	Size Category	Ontario Energy Efficiency Act Minimum Efficiency	Test Procedure
Air Cooled, With Condenser, Electrically Operated	< 528 kW (< 150 tons)	2.80 COP 3.05 IPLV	CAN/CSA-C743 ARI 550, ARI 590
	≥ 528 kW (≥ 150 tons)	2.80 COP 3.05 IPLV	CAN/CSA-C743 ARI 550, ARI 590
Air Cooled, Without Condenser, Electrically Operated	All Capacities	3.10 COP 3.45 IPLV	CAN/CSA-C743 ARI 550, ARI 590
Water Cooled, Electrically Operated, Positive Displacement (Reciprocating)	All Capacities	4.20 COP 5.05 IPLV	CAN/CSA-C743 ARI 590
Water Cooled, Electrically Operated, Positive Displacement (Rotary Screw and Scroll)	< 528 kW (< 150 tons)	4.45 COP 5.20 IPLV	CAN/CSA-C743 ARI 550
	≥ 528 kW and < 1055 kW (≥ 150 tons and < 300 tons)	4.90 COP 5.60 IPLV	CAN/CSA-C743 ARI 550
	≥ 1055 kW (≥ 300 tons)	5.50 COP 6.15 IPLV	CAN/CSA-C743 ARI 550
Water Cooled, Electrically Operated, (Centrifugal)	< 528 kW (< 150 tons)	5.00 COP 5.25 IPLV	CAN/CSA-C743 ARI 550
	≥ 528 kW and < 1055 kW (≥ 150 tons and < 300 tons)	5.55 COP 5.90 IPLV	CAN/CSA-C743 ARI 550
	≥ 1055 kW (≥ 300 tons)	6.10 COP 6.40 IPLV	CAN/CSA-C743 ARI 550
Single Effect Absorption Air Cooled	All Capacities	0.60 COP	CAN/CSA-C743 ARI 560
Single Effect Absorption Water Cooled	All Capacities	0.70 COP	CAN/CSA-C743 ARI 560
Double Effect Absorption Indirect-Fired	All Capacities	1.00 COP 1.05 IPLV	CAN/CSA -C743 ARI 560
Double Effect Absorption Direct-Fired	All Capacities	1.00 COP 1.00 IPLV	CAN/CSA-C743 ARI 560

Table 6.8.1D
Packaged Terminal Air Conditioners, Packaged Terminal Heat Pumps, Single-Package Vertical Air Conditioners, Single-Package Vertical Heat Pumps, Room Air Conditioners and Room Air Conditioner Heat Pumps, Electrically Operated, Minimum Efficiency Requirements

Equipment Type	Size Category (input)	Sub-Category or Rating Condition	Minimum Efficiency	Test Procedure
PTAC (Cooling Mode) New Construction	All Capacities	35°C (95°F) db Outdoor Air	12.5 - (0.213 x Cap/293.1) EER 12.5 - (0.213 x Cap/1000) EER	CAN/CSA C744 ARI 310/380
PTAC (Cooling Mode) Replacements	All Capacities	35°C (95°F) db Outdoor Air	10.9 - (0.213 x Cap/293.1) EER 10.9 - (0.213 x Cap/1000) EER	CAN/CSA-C744 ARI 310/380
PTHP (Cooling Mode) New Construction	All Capacities	35°C (95°F) db Outdoor Air	12.3 - (0.213 x Cap/293.1) EER 12.3 - (0.213 x Cap/1000) EER	CAN/CSA-C744 ARI 310/380
PTHP (Cooling Mode) Replacements	All Capacities	35°C (95°F) db Outdoor Air	10.8 - (0.213 x Cap/293.1) EER 10.8 - (0.213 x Cap/1000) EER	CAN/CSA-C744 ARI 310/380
PTHP (Heating Mode) New Construction	All Capacities		3.2 - (0.026 x Cap/293.1) COP 3.2 - (0.026 x Cap/1000) COP	CAN/CSA-C744 ARI 310/380
PTHP (Heating Mode) Replacements	All Capacities		2.9 - (0.026 x Cap/293.1) COP 2.9 - (0.026 x Cap/1000) COP	CAN/CSA-C744 ARI 310/380
SPVAC (Cooling Mode)	All Capacities	35°C db / 23.9°C wb (95°F db/ 75°F wb) Outdoor Air	8.6 EER	CAN/CSA-C746 ARI 390
SPVHP (Cooling Mode)	All Capacities	35°C db / 23.9°C wb (95°F db/ 75°F wb) Outdoor Air	8.6 EER	CAN/CSA-C746 ARI 390
SPVHP (Heating Mode)	All Capacities	8.3°C db / 6.1°C wb (47°F db / 43°F wb) Outdoor Air	2.7 COP	CAN/CSA-C746 ARI 390
Room Air Conditioners, With Louvered Sides	< 1.8 kW (< 6,000 Btu/h)		9.7 EER	CSA C368.1-M C368.1 only applies to equipment < 10.55kW (< 36,000 Btu/h) ANSI/AHAM RAC-1
	≥ 1.8 kW and < 2.3 kW (≥ 6,000 Btu/h and < 8,000 Btu/h)		9.7 EER	
	≥ 2.3 kW and < 4.1 kW (≥ 8,000 Btu/h and < 14,000 Btu/h)		9.8 EER	
	≥ 4.1 kW and < 5.9 kW (≥ 14,000 Btu/h and < 20,000 Btu/h)		9.7 EER	
	≥ 5.9 kW (≥ 20,000 Btu/h)		8.5 EER	
Room Air Conditioners, Without Louvered Sides	< 2.3 kW (< 8,000 Btu/h)		9.0 EER	CSA C368.1-M ANSI/AHAM RAC-1
	≥ 2.3 kW and < 5.9 kW (≥ 8,000 Btu/h and < 20,000 Btu/h)		8.5 EER	
	≥ 5.9 kW (≥ 20,000 Btu/h)		8.5 EER	

Table 6.8.1D (Cont'd)
Packaged Terminal Air Conditioners, Packaged Terminal Heat Pumps, Single-Package Vertical Air Conditioners, Single-Package Vertical Heat Pumps, Room Air Conditioners and Room Air Conditioner Heat Pumps, Electrically Operated, Minimum Efficiency Requirements

Equipment Type	Size Category (input)	Sub-Category or Rating Condition	Minimum Efficiency	Test Procedure
Room Air Conditioner Heat Pumps With Louvered Sides	< 5.9 kW (< 20,000 Btu/h)		9.0 EER[1]	CSA C368.1-M ANSI/AHAM RAC-1
	≥ 5.9 kW (≥ 20,000 Btu/h)		8.5 EER[1]	
Room Air Conditioner Heat Pumps Without Louvered Sides	< 4.1 kW (< 14,000 Btu/h)		8.5 EER[1]	CSA C368.1-M ANSI/AHAM RAC-1
	≥ 4.1 kW (≥ 14,000 Btu/h)		8.0 EER[1]	
Room Air Conditioner, Casement Only	All Capacities		8.7 EER[1]	ANSI/AHAM RAC-1
Room Air Conditioner, Casement-Slider	All Capacities		9.5 EER[1]	ANSI/AHAM RAC-1

Notes to Table 6.8.1D:

(1) Minimum efficiency regulated by Ontario Energy Efficiency Act.

(2) Minimum efficiency specified in ANSI/ASHRAE/IESNA Standard 90.1.

(3) Cap is the rated cooling capacity in W. Cap is the rated cooling capacity in Btu/h. If unit capacity is less that 2,030 W (7,000 Btu/h), use 2,030 W (7,000 Btu/h) in calculation. If greater than 4,390 W (15,000 Btu/h), use 4,390 W (15,000 Btu/h) in calculation.

(4) Replacements must be factory labeled as follows: "MANUFACTURED FOR REPLACEMENT APPLICATIONS ONLY: NOT TO BE INSTALLED IN NEW CONSTRUCTION PROJECTS." Replacement efficiencies apply only to units with existing wall sleeves less than 0.41 m (16 in) high and less than 1.07 m (42 in.) wide.

Table 6.8.1E
Warm Air Furnaces and Combination Warm Air Furnaces/Air-Conditioning Units, Warm Air Duct Furnaces and Units Heaters Minimum Efficiency Requirements

Equipment Type	Size Category (input)	Sub-Category or Rating Condition	Ontario Energy Efficiency Act Minimum Efficiency	Test Procedure
Warm Air Furnace, Gas-Fired	< 66 kW (< 225,000 Btu/h)	Single-phase	78% AFUE	CGA-P.2 DOE 10 CFR Part 430 or ANSI Z21.47
		Three-phase	78% AFUE or 80% E_t	
	≥ 66 kW and < 117 kW (≥ 225,000 Btu/h and < 400,000 Btu/h)	Maximum Capacity*	80% E_t	CSA 2.3 ANSI Z21.47
	≥ 117 kW (≥ 400,000 Btu/h)	Maximum Capacity*	80% E_t	CGA P.8 ANSI Z21.47
Warm Air Furnace, Oil-Fired	< 66 kW (< 225,000 Btu/h)		78% SEUE	CSA B212 DOE 10 CFR Part 430 or UL 727
	≥ 66 kW (≥ 225,000 Btu/h)	Maximum Capacity*	81% E_t	UL 727
Warm Air Duct Furnaces, Gas-Fired	All Capacities	Maximum Capacity*	80% E_c	ANSI Z83.9
Warm Air Unit Heaters, Gas-Fired	All Capacities	Maximum Capacity*	80% E_c	CSA 2.6 ANSI Z83.8
Unit Heaters, Oil-Fired	All Capacities	Maximum Capacity*	80% E_c	UL 731

E_t is thermal efficiency and E_c is combustion efficiency. E_c = 100% less flue losses.
*Maximum capacity as provided for and allowed by unit controls.

Table 6.8.1F
Gas-Fired and Oil-Fired Boilers, Minimum Efficiency Requirements

Equipment Type	Size Category (input)	Sub-Category or Rating Condition	Minimum Efficiency	Test Procedure
Boilers, Gas-Fired	< 88 kW (< 300,000 Btu/h)	Hot Water	80% AFUE[1]	CGA P.2 DOE 10 CFR Part 430
		Steam	75% AFUE[1]	
	> 88 kW and ≤ 733 kW (> 300,000 Btu/h and ≤ 2,500,000 Btu/h)	Maximum Capacity*	75%[2] E_t	Hydronics Institute BTS
	> 733 kW (> 2,500,000 Btu/h)	Hot Water	80%[2] E_c	Hydronics Institute BTS
		Steam	80%[2] E_c	
Boilers, Oil-Fired	< 88 kW (< 300,000 Btu/h)		80% SEUE[1]	CSA B212 DOE 10 CFR Part 430
	> 88 kW and ≤ 733 kW (> 300,000 Btu/h and ≤ 2,500,000 Btu/h)	Maximum Capacity*	78%[2] E_t	(Hydronics Institute)
	> 733 kW (> 2,500,000 Btu/h)	Hot Water	83%[2] E_c	Hydronics Institute BTS
		Steam	83%[2] E_c	
Boilers, Oil-Fired (Residual)	> 88 kW and ≤ 733 kW >(300,000 Btu/h and ≤ 2,500,000 Btu/h)	Maximum Capacity*	78%[2] E_t	Hydronics Institute BTS
	> 733 kW (> 2,500,000 Btu/h)	Hot Water	83%[2] E_c	Hydronics Institute BTS
		Steam	83%[2] E_c	

E_t is thermal efficiency and E_c is combustion efficiency. E_c = 100% less flue losses

*Maximum capacity as provided for and allowed by the unit's controls.

Notes to Table 6.8.1F:

(1) Minimum efficiency regulated by Ontario Energy Efficiency Act.

(2) Minimum efficiency specified in ANSI/ASHRAE/IESNA Standard 90.1.

Table 6.8.1G
Cooling Tower Performance Requirements

Equipment Type	Size Category	Sub-Category or Rating Condition	ASHRAE 90.1-2004 Performance Required	Test Procedure
Propeller or Axial Fans	All Capacities	35°C (95°F) Entering Water 29°C (85°F) Leaving Water 24°C (75°F) wb Outdoor Air	≥ 3.23 L/s·kW (≥ 38.2 gpm/hp)	CTI ATC-105
Centrifugal Fans	All Capacities	35°C (95°F) Entering Water 29°C (85°F) Leaving Water 24°C (75°F) wb Outdoor Air	≥ 1.7 L/s·kW (≥ 20.0 gpm/hp)	CTI ATC-105
Air- cooled Condensers	All Capacities	52°C (125°F) Condensing Temperature R-22 Test Fluid 88°C (190°F) Entering Gas Temperature 35°C (95°F) Entering db 8°C (15°F) Subcooling	≥ 69 COP (≥ 176,000 Btu/h·hp)	ARI 460

For purpose of this Table, cooling tower performance is maximum flow rating divided by fan nameplate rated motor power.

Air-cooled condenser performance is defined as heat rejected from the refrigerant divided by the fan nameplate rated motor power.

Section 7 Service Water Heating

7.4 Mandatory Provisions

7.4.2 Equipment Efficiency

7.4.2 is replaced with the following:

7.4.2 Equipment Efficiency. All water heating equipment, hot water supply boilers used solely for heating potable water, pool heaters, and hot water storage tanks shall meet the criteria listed in Table 7.8. The minimum efficiency values of the Ontario Energy Efficiency Act shall apply if provided. Otherwise, the minimum efficiency values of ANSI/ASHRAE/IESNA Standard 90.1 shall apply. Where multiple rating conditions or performance requirements are provided, the equipment shall satisfy all requirements. Omission of minimum performance requirements for certain classes of equipment does not preclude use of such equipment where appropriate. Equipment not listed in Table 7.8 has no minimum performance requirements.

7.4.4.3 Temperature. The water outlet temperature refers only to the water temperature supplied to the fixture. It has no implication on the source temperature of the water which may be tempered by temperature gauges and control devices before it is supplied to the fixture.

7.4.5 Swimming Pool Covers

7.4.5.2 is replaced with the following:

7.4.5.2 Pool Covers. Heated exterior swimming pools (including lap pools and permanent whirlpools) shall be equipped with pool covers.

Exception. Pools deriving over 60% of their energy for heating (computed over an annual operating season) from site-recovered or site-solar energy.

Table 7.8 Performance Requirements for Water Heating Equipment

Replace Table 7.8 with the following:

Table 7.8
Water Heating Equipment, Performance Requirements

Equipment Type	Size Category	Sub-Category or Rating Condition	Minimum Efficiency	Test Procedure
Electric Storage Water Heaters	All Capacities	Resistance 50 L and 284 L (13.2 gal and 75 gal)	0.97 - 0.000349V EF (0.97 - 0.00132 V, EF) 35 + 0.20V SL (119.4 + 2.583V, SL) 40 + 0.20V SL (136.5 + 2.583V, SL)	CSA C745 CAN/CSA -C191
	All Capacities	Resistance > 284 L and 454 L (> 75 gal and < 120 gal)	0.97 - 0.000349V EF (0.97 - 0.00132 V, EF) 0.472V - 38.5 SL (6.095V, - 131.4 SL) 0.472V - 33.5 SL (6.095V, - 114.3 SL)	CSA C745 CAN/CSA-C191
	24 Amps and 250 volts	Heat Pump	0.93 - 0.000349 V EF^4 (0.93 - 0.00132 V, EF)^4	CSA C745 DOE 10 CFR Part 430
Gas Storage Water Heaters	21.98 kW (75,000 Btu/h)	75.7L and < 378.5 L (20 gal and < 100 gal)	0.67 - 0.0005V EF (0.67 - 0.00189 V, EF)	CSA P.3 DOE 10 CFR Part 430
	> 21.98 kW (> 75,000 Btu/h)	< 309.75 W/L (< 4,000 Btu/h/gal)	80% E $Q/800 - 16.57\sqrt{V}$ SL $Q/800 - 110\sqrt{V}$ SL	CSA P.3 ANSI Z21.10.3
Gas Instantaneous Water Heaters	> 14.66 kW and < 58.62 kW (> 50,000 Btu/h and < 200,000 Btu/h)	309.75 W/L and < 7.57 L (4,000 Btu/h/gal and < 2 gal)	0.62 - 0.0005V EF (0.62 - 0.00189 V, EF)	CSA 4.3 DOE 10 CFR Part 430
	58.62 kW (200,000 Btu/h)	309.75 W/L and < 37.85 L (4,000 Btu/h/gal and < 10 gal)	80% E	CSA 4.3 ANSI Z21.10.3
	58.62 kW (200,000 Btu/h)	309.75 W/L and 37.85 L (4,000 Btu/h/gal and 10 gal)	80% E $Q/800 - 16.57\sqrt{V}$ SL $Q/800 + 110\sqrt{V}$ SL	CSA 4.3 ANSI Z21.10.3
Oil Storage Water Heaters	30.78 kW (105,000 Btu/h)	75.7 L (20 gal)	0.59 - 0.0005V EF (0.59 - 0.00189 V, EF)	CAN/CSA-B211 DOE 10 CFR Part 430
	> 30.78 kW (> 105,000 Btu/h)	< 309.75 W/L (< 4,000 Btu/h/gal)	78% E $Q/800 - 16.57\sqrt{V}$ SL $Q/800 - 110\sqrt{V}$ SL	ANSI Z21.10.3
Oil Instantaneous Water Heaters	61.55 kW (210,000 Btu/h)	309.75 W/L and <7.57 L (4,000 Btu/h/gal and < 2 gal)	0.59 - 0.0005V EF (0.59 - 0.0019V, EF)	DOE 10 CFR Part 430
	> 61.55 kW (> 210,000 Btu/h)	309.75 W/L and <37.85 L (4,000 Btu/h/gal and <10 gal)	80% E	ANSI Z21.10.3
	> 61.55 kW (> 210,000 Btu/h)	309.75 W/L and 37.85 L (4,000 Btu/h/gal and 10 gal)	78% E $Q/800 - 16.57\sqrt{V}$ SL $Q/800 - 110\sqrt{V}$ SL	ANSI Z21.10.3
Hot Water Supply Boilers Gas and Oil	87.93 kW and < 3663.8 kW (300,000 Btu/h and < 12,500,000 Btu/h)	309.75 W/L and < 37.85 L (4,000 Btu/h/gal and < 10 gal)	80% E	ANSI Z21.10.3
Hot Water Supply Boilers Gas		309.75 W/L and 37.85 L (4,000 Btu/h/gal and 10 gal)	80% E $Q/800 + 16.57\sqrt{V}$ SL $Q/800 - 110\sqrt{V}$ SL	ANSI Z21.10.3

Table 7.8 (Cont'd)
Water Heating Equipment, Performance Requirements

Equipment Type	Size Category	Sub-Category or Rating Condition	Minimum Efficiency	Test Procedure
Hot Water Supply Boilers Oil		309.75 W/L and 37.85L (4,000 Btu/h/gal and 10gal)	78% E$^{(3)(5)}$ $Q/800 - 16.57\sqrt{V}$ SL $Q/800 - 110\sqrt{V}$ SL	ANSI Z21.10.3
Pool Heaters, Gas	All		78% E$^{(3)(4)}$	CGA P.6 ASHRAE 146
Pool Heaters, Oil	All		78% E$^{(3)(4)}$	ASHRAE 146
Heat Pump Pool Heaters	All		4.0 COP$^{(5)}$	ASHRAE 146
Unfired Storage Tanks	All		RSI-2.2 (R-12.5)$^{(5)}$	NONE

Notes to Table 7.8:

(1) Without bottom inlet SL is the standby loss in W V is the storage capacity in litres
(2) With bottom inlet SL is the standby loss in Btu/h V is the storage capacity in gallons
(3) E is the thermal efficiency
(4) Minimum efficiency regulated by Ontario Energy Efficiency Act
(5) Minimum efficiency specified in ANSI/ASHRAE/IESNA Standard 90.1

Section 9 Lighting

9.1 General

9.1 is amended by adding 9.1.5:

9.1.5 Ballasts

9.1.5.1 Fluorescent Lamp Ballasts

9.1.5.1.1 The ballast efficacy factor (BEF) of fluorescent lamp ballasts shall conform to Table 9.1.5.1 where
(a) the ballast operates at nominal input voltages of 120, 277 or 347 volts;
(b) the input frequency is 60 Hz;
(c) the maximum lamp operating current is less than 1,000 milliamperes;
(d) the ballast is used to operate one of the following lamp types:
1. one or two 4-ft. nominal 40 W, rapid-start lamps,
2. two 8-ft. nominal 75 W, slimline lamps,
3. two 8-ft. nominal 110 W, high-output rapid-start lamps;
(e) the ballast is not specifically designed for starting at temperatures below 4.5°C (40°F); and
(f) the ballast is not specifically designed for use with dimming controls.

9.1.5.1.2 The ballast efficacy factor (BEF) shall be calculated in accordance with Equation 9-1:

$$\text{BEF} = \frac{\text{BF}}{\text{Power input}} \qquad (9\text{-}1)$$

where

BF = ballast factor, expressed as a percent, such as 95;
power input = total wattage of combined lamps and ballasts.

9.1.5.1.3 Tests for BF and power input shall be in accordance with CAN/CSA-C654, "Fluorescent Lamp Ballast Efficacy Measurements".

9.1.5.2 Other Fluorescent Lamp Ballasts. Ballasts that do not have all the characteristics listed in 9.1.5.1.1 are not required to meet the BEF in Table 9.1.5.1 and may be used as required.

9.1.5.3 One-lamp or three-lamp fluorescent luminaires recess-mounted within 3 m (10 ft) center to center of each other or pendant mounted or surface mounted within 0.3 m (1 ft) of each other, and within the same room, shall be tandem wired to eliminate unnecessary use of single-lamp ballasts.
Exception: Three-lamp ballasts may be used.

9.1.5.4 All ballasts shall have a power factor of 90% or greater.
Exceptions:
(a) ballasts for circline and compact fluorescent lamps and low-wattage high-intensity discharge lamps of 100 W or less;
(b) dimming ballasts.

Table 9.1.5.1
Fluorescent Lamp Ballast Efficacy Factors(1)

Application for Operation of	Ballast Input Voltage	Total Nominal Lamp Watts	Ontario Energy Efficiency Act Ballast Efficacy Factor
One F40T12 Lamp(2)	120 V	40	2.290
	277 V	40	2.290
	347 V	40	2.220
Two F40T12 Lamps(2)	120 V	80	1.170
	277 V	80	1.170
	347 V	80	1.120
Two F96T12 Lamps(3)	120 V	150	0.630
	277 V	150	0.630
	347 V	150	0.620
Two 110W/F96T12HO Lamps(4)	120 V	220	0.390
	277 V	220	0.390
	347 V	220	0.380
Two F32T8 Lamps	120 V	64	1.250
	277 V	64	1.230
	347 V	64	1.200
Column 1	2	3	4

Notes to Table 9.1.5.1:
(1) All fluorescent lamp ballasts must have a minimum power factor of at least 0.9 at indicated voltage.
(2) Also for use on 34W/48T12/RS and 40W/48T10/RS lamps.
(3) Also for use on 60W/96T12/IS lamps.
(4) Also for use on 95W/96T12/HO lamps.

Section 10 Other Equipment

10.4 Mandatory Provisions

10.4.1 Electric Motors is replaced with the following:

10.4.1 Electric Motors. Where electric motors are regulated by the Ontario Energy Efficiency Act, the efficiency levels shall be based on CSA-C390-M. Values shown in Table 10.8 are minimum motor efficiency levels established by the Ontario Energy Efficiency Act.

Table 10.8
Minimum Nominal Efficiency for Motors

Motor		Open Motors				Enclosed Motors			
		Speed (RPM)				Speed (RPM)			
		3600	1800	1200	900	3600	1800	1200	900
		Number of Poles				Number of Poles			
kW	(hp)	2	4	6	8	2	4	6	8
0.8	(1)	75.5	82.5	80.0	84.0	75.5	82.5	80.0	74.0
1.1	(1.5)	82.5	84.0	84.0	75.5	82.5	84.0	85.5	77.0
1.5	(2)	84.0	84.0	85.5	85.5	84.0	84.0	86.5	82.5
2.2	(3)	84.0	86.5	86.5	86.5	85.5	87.5	87.5	84.0
3.7	(5)	85.5	87.5	87.5	87.5	87.5	87.5	87.5	85.5
5.6	(7.5)	87.5	88.5	88.5	88.5	88.5	89.5	89.5	85.5
7.5	(10)	88.5	89.5	90.2	89.5	89.5	89.5	89.5	88.5
11.1	(15)	89.5	91.0	90.2	89.5	90.2	91.0	90.2	88.5
14.9	(20)	90.2	91.0	91.0	90.2	90.2	91.0	90.2	89.5
18.7	(25)	91.0	91.7	91.7	90.2	91.0	92.4	91.7	89.5
22.4	(30)	91.0	92.4	92.4	91.0	91.0	92.4	91.7	91.0
29.8	(40)	91.7	93.0	93.0	91.7	91.7	93.0	93.0	91.0
37.3	(50)	92.4	93.0	93.0	91.7	92.4	93.0	93.0	91.7
44.8	(60)	93.0	93.6	93.6	92.4	93.0	93.6	93.6	91.7
56	(75)	93.0	94.1	93.6	93.6	93.0	94.1	93.6	93.0
74.6	(100)	93.0	94.1	94.1	93.6	93.6	94.5	94.1	93.0
93.3	(125)	93.6	94.5	94.1	93.6	94.5	94.5	94.1	93.6
111.9	(150)	93.6	95.0	94.5	93.6	94.5	95.0	95.0	93.6
130.6	(175)	94.5	95.0	94.5	93.6	95.0	95.0	95.0	94.1
149.2	(200)	94.5	95.0	94.5	93.6	95.0	95.0	95.0	94.1
Column 1		2	3	4	5	6	7	8	9

Section 11 Energy Cost Budget Method

11.2 Simulation General Requirements

11.2.3 Purchased Energy Rates is replaced with the following:

11.2.3 Purchased Energy Rates. Annual energy costs for purchased energy, such as electricity, gas, oil, propane, steam, and chilled water, shall be determined using actual published rates and costs to the building. Contact local utility for energy rates. For the purposes of a building permit application, because of fluctuations in energy rates, the rates used in a building design are valid if they are published not more than 3 months prior to the date of permit application.

Table 11.3.1 Modelling Requirements for Calculating Design Energy Cost and Energy Cost Budget

Section 5. Building Envelope in Table 11.3.1 is replaced with the following:

No.	Proposed Building Design (Column A) Design Energy Cost (DEC)	Budget Building Design (Column B) Energy Cost Budget (ECB)
5. Building Envelope		
	All Components in the building envelope in the proposed design shall be modeled as shown on architectural drawings or as installed for existing building envelopes. However, there are some default values for infiltration, solar absorbtivity, and shading. Note: default values are to be used unless more appropriate values for the specific building system or equipment are available.	The budget building design shall have identical conditioned floor area and identical exterior dimensions and orientations as the proposed design. The insulation and glazing characteristics of the budget building design shall be determined by using the first selection of the "base case" for the appropriate climate range as defined from the alternate component Tables (ACP), with no assumed overhangs(projection factor of 0.0), shading coefficient of 0.70, and lightweight walls. The overall U-Value of the fenestration is the highest value under the first column under "base case". The internal load density (ILD) must be calculated based on building wide average values.
	When the HVAC system is on, no infiltration shall be assumed to occur. When the HVAC system is off, the infiltration rate for buildings with or without operable windows shall be assumed to be 0.193 L/s-m^2 (0.038 cfm/ft^2) of the gross exterior wall. However, hotels or motels and multi-family buildings shall have infiltration rates of 0.193 L/s-m^2 (0.038 cfm/ft^2) of gross exterior wall area at all times. These are default assumptions for the proposed design.	Same as proposed design. However these are prescribed values and cannot be varied.
	The solar absorptivity of opaque elements of the building envelope shall be assumed to be 70%. The solar absorptivity of ground surfaces shall be assumed to be 80% (20% reflectivity). These are default assumptions for the proposed design	Same as proposed design. However these are prescribed values and cannot be varied.

No shades is the default assumption. However, if the proposed design includes drapes or blinds, the effect can be modelled to reduce the glass shading coefficient. If blinds are manually operated the reduction can be applied to no more than 50% of the total fenestration area of a zone.	No draperies or blinds are to be modeled. That is, the glass shading coefficient (SC_x) should be unaltered, with no reduction due to internal (or external) shading.
Shading by permanent structures, terrain, and vegetation shall be taken into account for computing energy consumption whether or not these features are located on the building site. A permanent fixture is one that is likely to remain for the life of the proposed design.	Same as proposed design.

Chapter 3 Supplement to MNECB

Part 3 Building Envelope

Part 3 of MNECB is replaced with the following:

3.1. General

3.1.1. Building Envelope

3.1.1.1. Compliance

(1) The building envelope shall comply with the requirements of Section 5 in Chapter 2 of this Supplementary Standard.

Part 4 Lighting

Section 4.2. Mandatory Provisions

4.2.1. Exterior Lighting Power

4.2.1.2. Entrance and Exit Lighting

Table 4.2.1.2. of MNECB is replaced with the following:

Table 4.2.1.2.
Lighting Power Densities for Building Exteriors

Area Description	Allowance
Uncovered Parking Lots and drives	1.6 W/m^2 (0.15 W/ft^2)
Walkways less than 3 m (10 ft) wide	3.3 W/linear m (1.0 W/linear foot)
Walkways 3 m (10 ft) or greater, plaza areas, special feature areas	2.2 W/m^2 (0.2 W/ft^2)
Stairways	10.8 W/m^2 (1.0 W/ft^2)
Building Main entries	98 W/linear m (30 W/linear ft) of door width
Other doors	66 W/linear m (20 W/linear ft) of door width
Canopies (free standing and attached and overhangs)	13.5 W/m^2 (1.25 W/ft^2)
Outdoor Sales Open areas (including vehicle sale lots)	5.4 W/m^2 (0.5 W/ft^2)
Street frontage for vehicle sales lots in addition to "open area" allowance	66 W/linear m (20 W/linear foot)
Building Facades	2.2 W/m^2 (0.2 W/ft^2) for each illuminated wall or surface or 16.4 W/linear m (5.0 W/linear foot) for each illuminated wall or surface length
Automated teller machines and night depositories	270 W per location plus 90 W per additional ATM per location
Entrances and gatehouse inspection stations at guarded facilities	13.5 W/m^2 (1.25 W/ft^2) of uncovered area
Loading areas for law enforcement and emergency service vehicles	5.4 W/m^2 (0.5W/ft^2) of uncovered area
Drive-up windows	400 W per drive-through
Parking near 24-hour retail entrances	800 W per main entry
Column 1	2

4.2.5. Ballasts

4.2.5.1. Fluorescent Light Ballasts

Sentence 4.2.5.1.(3) is replaced with the following:

(3) Fluorescent ballast efficacy factors shall meet the requirements of Table 9.1.5.1 in Chapter 2 of this Supplementary Standard.

Section 4.3. Prescriptive Compliance

4.3.2. Calculation of Interior Lighting Power Allowance by Building Type

4.3.2.1. Interior Lighting Power Allowance by Building Type

Table 4.3.2.1. of MNECB is replaced with the following:

Table 4.3.2.1.
Lighting Power Densities Using the Building Area Method

Lighting Power Density		
Building Area Type[a]	W/m²	(W/ft²)
Automotive Facility	10	(0.9)
Convention Center	13	(1.2)
Court House	13	(1.2)
Dining: Bar Lounge/Leisure	14	(1.3)
Dining: Cafeteria/Fast Food	15	(1.4)
Dining: Family	17	(1.6)
Dormitory	11	(1.0)
Exercise Center	11	(1.0)
Gymnasium	12	(1.1)
Health Care-Clinic	11	(1.0)
Hospital	13	(1.2)
Hotel	11	(1.0)
Library	14	(1.3)
Manufacturing Facility	14	(1.3)
Motel	11	(1.0)
Motion Picture Theater	13	(1.2)
Multi-Family	8	(0.7)
Museum	12	(1.1)
Office	11	(1.0)
Parking Garage	3	(0.3)
Penitentiary	11	(1.0)
Performing Arts Theater	17	(1.6)
Police/Fire Station	11	(1.0)
Post Office	12	(1.1)
Religious Building	14	(1.3)
Retail	16	(1.5)
School/University	13	(1.2)
Sports Arena	12	(1.1)
Town Hall	12	(1.1)
Transportation	11	(1.0)
Warehouse	9	(0.8)
Workshop	15	(1.4)
Column 1	2	

(a) In cases where both a common space type and a building specific type are listed, the building specific space type shall apply.

4.3.3. Calculation of Interior Lighting Power Allowance by Space Function.

4.3.3.4. Determination of Lighting Power Density by Space Function.

Table 4.3.3.4. of MNECB is replaced with the following:

Table 4.3.3.4.
Lighting Power Densities Using the Space-by-Space Method

Common Space Types(1)	W/m^2	(W/ft^2)	Building Specific Space Types	W/m^2	(W/ft^2)
Office-Enclosed	12	(1.1)	Gymnasium / Exercise Center		
Office-Open Plan	12	(1.1)	Playing Area	15	(1.4)
Conference / Meeting / Multipurpose	14	(1.3)	Exercise Area	10	(0.9)
Classroom / Lecture / Training	15	(1.4)	Courthouse / Police Station / Penitentiary		
For Penitentiary	14	(1.3)	Courtroom	20	(1.9)
Lobby	14	(1.3)	Confinement Cells	10	(0.9)
For Hotel	12	(1.1)	Judges Chambers	14	(1.3)
For Performing Arts Theater	36	(3.3)	Fire Stations		
For Motion Picture Theater	12	(1.1)	Fire Station Engine Room	9	(0.8)
Audience / Seating Area	10	(0.9)	Sleeping Quarters	3	(0.3)
For Gymnasium	4	(0.4)	Post Office-Sorting Area	13	(1.2)
For Exercise Center	3	(0.3)	Convention Center-Exhibit Space	14	(1.3)
For Convention Center	8	(0.7)	Library		
For Penitentiary	8	(0.7)	Car File and Cataloging	12	(1.1)
For Religious Buildings	18	(1.7)	Stacks	18	(1.7)
For Sports Arena	4	(0.4)	Reading Area	13	(1.2)
For Performing Arts Theater	28	(2.6)	Hospital		
For Motion Picture Theater	13	(1.2)	Emergency	29	(2.7)
For Transportation	5	(0.5)	Recovery	9	(0.8)
Atrium-First Three Floors	6	(0.6)	Nurse Station	11	(1.0)
Atrium-Each Additional Floor	2	(0.2)	Exam / Treatment	16	(1.5)
Lounge / Recreation	13	(1.2)	Pharmacy	13	(1.2)
For Hospital	9	(0.8)	Patient Room	8	(0.7)
Dining Area	10	(0.9)	Operating Room	24	(2.2)
For Penitentiary	14	(1.3)	Nursery	6	(0.6)
For Hotel	14	(1.3)	Medical Supply	15	(1.4)
For Motel	13	(1.2)	Physical Therapy	10	(0.9)
For Bar Lounge / Leisure Dining	15	(1.4)	Radiology	4	(0.4)
For Family Dining	23	(2.1)	Laundry-Washing	6	(0.6)

Notes to Table 4.3.3.4.:

(1) In cases where both a common space type and a building specific type are listed, the building specific space type shall apply.

Table 4.3.3.4. (Cont'd)
Lighting Power Densities Using the Space-by-Space Method

Common Space Types(1)	W/m^2	(W/ft^2)	Building Specific Space Types	W/m^2	(W/ft^2)
Food Preparation	13	(1.2)	Automotive-Service / Repair	8	(0.7)
Laboratory	15	(1.4)	Manufacturing		
Restrooms	10	(0.9)	Low Bay [<7.6 m (<25 ft)] floor to ceiling height)	13	(1.2)
Dressing / Locker / Fitting Room	6	(0.6)	High Bay [≥7.6 m (≥25 ft)] floor to ceiling height)	18	(1.7)
Corridor / Transition	5	(0.5)	Detailed Manufacturing	23	(2.1)
For Hospital	11	(1.0)	Equipment Room	13	(1.2)
For Manufacturing Facility	5	(0.5)	Control Room	5	(0.5)
Stairs-Active	6	(0.6)	Hotel / Motel Guest Rooms	12	(1.1)
Active Storage	9	(0.8)	Dormitory-Living Quarters	12	(1.1)
For Hospital	10	(0.9)	Museum		
Inactive Storage	3	(0.3)	General Exhibition	11	(1.0)
For Museum	9	(0.8)	Restoration	18	(1.7)
Electrical / Mechanical	16	(1.5)	Bank / Office-Banking Activity Area	16	(1.5)
Workshop	20	(1.9)	Religious Buildings		
			Worship Pulpit, Choir	26	(2.4)
			Fellowship Hall	10	(0.9)
			Retail		
			Sales Area	18	(1.7)
			Mall Concourse	18	(1.7)
			Sports Arena		
			Ring Sports Area	29	(2.7)
			Court Sports Area	25	(2.3)
			Indoor Playing Field Area	15	(1.4)
			Warehouse		
			Fine Material Storage	15	(1.4)
			Medium / Buky Material Storage	10	(0.9)
			Parking Garage-Garage Area	2	(0.2)
			Transportation		
			Airport-Concourse	6	(0.6)
			Air / Train/Bus-Baggage Area	11	(1.0)
			Terminal-Ticket Counter	16	(1.5)

Notes to Table 4.3.3.4.:

(1) In cases where both a common space type and a building specific type are listed, the building specific space type shall apply.

Part 5 Heating, Ventilating and Air-Conditioning Systems

Section 5.2. Mandatory Provisions

5.2.13. Equipment Efficiency

5.2.13.1. Unit and Packaged Equipment

Table 5.2.13.1. of MNECB is replaced with Tables 6.8.1.A to 6.8.1.G in Chapter 2 of this Supplementary Standard.

Part 6 Service Water Heating Systems

Section 6.2. Mandatory Provisions

6.2.2. Storage Vessels and Heating Equipment

6.2.2.1. Equipment Efficiency

Table 6.2.2.1. of MNECB is replaced with Table 7.8 in Chapter 2 of this Supplementary Standard.

Part 7 Electrical Power

Section 7.2. Mandatory Requirements

Subsection 7.2.4. is replaced with the following:

7.2.4. Electric Motors

7.2.4.1. Nominal Efficiency

(1) The minimum nominal efficiency for electric motors shall meet the requirements of Table 10.8 in Chapter 2 of this Supplementary Standard.

Ministry of Municipal Affairs and Housing
Building and Development Branch

Ontario

Supplementary Standard SB-11

Construction of Farm Buildings

August 15, 2006

COMMENCEMENT

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SB-11 Construction of Farm Buildings

Section 1 General

1.1. Scope

1.1.1. Application

(1) This Section applies to farm buildings of low human occupancy.

1.1.2. Construction Requirements

(1) The construction of farm buildings of low human occupancy shall, subject to Article 1.3.1.2. of Division A of the Building Code, conform to the requirements of Part 9 of Division B of the Building Code except as provided in this Section.

1.2. Lumber

1.2.1. Lumber Requirements

(1) Except as permitted by Article 1.2.2., lumber shall conform to appropriate requirements in Subsection 9.3.2. of Division B of the Building Code.

1.2.2. Ungraded Lumber

(1) Ungraded lumber may be used for wood posts, joists, rafters, lintels, beams and wall studs in a farm building of low human occupancy of not more than one storey in building height.

(2) Ungraded lumber means lumber that has not been grade-stamped to indicate its grade, as determined by the NLGA "Standard Grading Rules for Canadian Lumber (Interpretation Included)", but that meets the following visual attributes:
(a) it is rough sawn to full nominal size,
(b) it has no evidence of decay,
(c) it has no tight knots that exceed 25 percent of the cross section and that are spaced closer than 150 mm on centres,
(d) it has no loose knots or holes that exceed 25 percent of the cross section and that are spaced closer than 600 mm on centres,
(e) it has the slope of grain not exceeding 1 (vertical) in 4 (horizontal), and
(f) it is free of excessive warp.

1.3. Structural Requirements

1.3.1. Structural Design

(1) Except as provided in Articles 1.3.2. to 1.3.4., wood posts, joists, rafters, lintels, beams and wall studs shall be designed in conformance with Section 9.4. of Division B of the Building Code.

1.3.2. Posts

(1) In a farm building of low human occupancy, the size of wood posts shall conform to Tables 1.3.2.A. to 1.3.2.J. for the loads shown in the Tables.

1.3.3. Spans

(1) In a farm building of low human occupancy, the spans of wood joists, rafters, lintels and beams shall conform to the spans shown in Tables 1.3.3.K. to 1.3.3.T. for the loads shown in the Tables.

1.3.4. Stud Size and Spacing

(1) In a farm building of low human occupancy, the size and spacing of wood studs shall conform to Tables 1.3.4.U. to 1.3.4.W. for the loads shown in the Tables.

Table 1.3.2.A.
Post Sizes for Diaphragm-Braced Farm Buildings of Low Human Occupancy

Forming Part of Sentence 1.3.2.(1)

Building Width, m	Wall Height, m	Spruce-Pine-Fir, No. 1, Dressed (Post and Timber Grades)														
		For Wind Loading q10 ≤ 0.30 kPa														
		Post Spacing, 2.4 m					Post Spacing, 3.6 m					Post Spacing, 4.8 m				
		Roof Load, kPa					Roof Load, kPa					Roof Load, kPa				
		1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3
9.14	≤3.0	A	A	A	A	A	A	A	A	A	A	A	A	B	B	B
	3.6	A	A	A	A	A	A	A	B	B	B	B	B	B	C	C
	4.2	B	B	B	B	B	B	B	B	C	C	B	C	C	C	C
	4.8	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C
	6.0	C	C	C	C	C	C	C	C	D	D	C	D	D	—	—
12.1	≤3.0	A	A	A	A	A	A	A	A	B	B	A	B	B	B	C
	3.6	A	A	A	A	B	A	B	B	B	C	B	B	C	C	C
	4.2	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C
	4.8	B	B	B	C	C	C	C	C	C	C	C	C	D	D	D
	6.0	C	C	C	C	C	C	C	D	D	—	D	D	—	—	—
15.2	≤3.0	A	A	A	A	A	A	A	B	B	B	B	B	B	C	C
	3.6	A	A	A	B	B	B	B	B	C	C	B	C	C	C	C
	4.2	B	B	B	B	C	B	C	C	C	C	C	C	C	D	D
	4.8	B	B	C	C	C	C	C	C	C	D	C	C	D	D	—
	6.0	C	C	C	C	D	C	D	D	—	—	D	—	—	—	—
18.2	≤3.0	A	A	A	B	B	A	B	B	B	C	B	B	C	C	C
	3.6	A	A	B	B	B	B	B	C	C	C	C	C	C	C	D
	4.2	B	B	B	C	C	C	C	C	C	C	C	C	D	D	D
	4.8	B	C	C	C	C	C	C	C	D	D	C	D	D	—	—
	6.0	C	C	C	D	D	D	D	—	—	—	—	—	—	—	—
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Legend - Post Sizes:

A = 89 mm x 140 mm

B = 140 mm x 140 mm

C = 140 mm x 184 mm

D = 184 mm x 184 mm

Notes to Table 1.3.2.A.:

(1) Designs are based on load combinations of total roof load and wind load acting at the same time on a closed building.

(2) Posts shall be oriented with the long dimension parallel to the building width.

(3) Bracing systems shall be specified by a competent designer.

(4) Posts shall be situated on footings and shall be anchored to prevent wind uplift.

(5) Posts shall be constrained against lateral movement at ground level and at the footing. Concrete floor, splash-rail and uplift anchor help to meet this condition.

(6) Post designs are based on partial fixity condition due to embedment in soil.

(7) Footing excavations should be backfilled with parent material unless otherwise specified by a competent designer.

Table 1.3.2.B.
Post Sizes for Diaphragm-Braced Farm Buildings of Low Human Occupancy
Forming Part of Sentence 1.3.2.(1)

Building Width, m	Wall Height, m	Spruce-Pine-Fir, No. 1, Dressed (Post and Timber Grades)														
		For Wind Loading q10 = 0.45 kPa														
		Post Spacing, 2.4 m					Post Spacing, 3.6 m					Post Spacing, 4.8 m				
		Roof Load, kPa					Roof Load, kPa					Roof Load, kPa				
		1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3
9.14	≤3.0	A	A	A	A	A	A	A	A	A	B	A	B	B	B	B
	3.6	A	A	A	A	A	A	B	B	B	B	B	B	C	C	C
	4.2	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C
	4.8	B	B	B	C	C	C	C	C	C	C	C	C	C	D	D
	6.0	C	C	C	C	C	C	D	D	D	D	D	—	—	—	—
12.1	≤3.0	A	A	A	A	A	A	A	B	B	B	B	B	B	C	C
	3.6	A	A	A	B	B	B	B	B	C	C	C	C	C	C	C
	4.2	B	B	B	B	C	C	C	C	C	C	C	C	C	C	D
	4.8	B	C	C	C	C	C	C	C	C	C	C	D	D	D	—
	6.0	C	C	C	C	D	D	D	D	—	—	—	—	—	—	—
15.2	≤3.0	A	A	A	A	B	A	B	B	B	C	B	B	C	C	C
	3.6	A	A	B	B	B	B	B	C	C	C	C	C	C	C	D
	4.2	B	B	B	C	C	C	C	C	C	C	C	C	D	D	D
	4.8	B	C	C	C	C	C	C	C	D	D	C	D	D	—	—
	6.0	C	C	C	D	D	D	D	—	—	—	—	—	—	—	—
18.2	≤3.0	A	A	A	B	B	B	B	B	C	C	B	C	C	C	C
	3.6	A	B	B	B	C	B	C	C	C	C	C	C	C	D	D
	4.2	B	B	C	C	C	C	C	C	C	D	C	D	D	D	—
	4.8	C	C	C	C	C	C	C	D	D	—	D	D	—	—	—
	6.0	C	C	D	D	—	D	—	—	—	—	—	—	—	—	—
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Legend - Post Sizes:

A = 89 mm x 140 mm	B = 140 mm x 140 mm	C = 140 mm x 184 mm	D = 184 mm x 184 mm

Notes to Table 1.3.2.B.:

(1) Designs are based on load combinations of total roof load and wind load acting at the same time on a closed building.

(2) Posts shall be oriented with the long dimension parallel to the building width.

(3) Bracing systems shall be specified by a competent designer.

(4) Posts shall be situated on footings and shall be anchored to prevent wind uplift.

(5) Posts shall be constrained against lateral movement at ground level and at the footing. Concrete floor, splash-rail and uplift anchor help to meet this condition.

(6) Post designs are based on partial fixity condition due to embedment in soil.

(7) Footing excavations should be backfilled with parent material unless otherwise specified by a competent designer.

Table 1.3.2.C.
Post Sizes for Knee-Braced Farm Buildings of Low Human Occupancy

Forming Part of Sentence 1.3.2.(1)

Building Width, m	Wall Height, m	Spruce-Pine-Fir, No. 1, Dressed (Post and Timber Grades)														
		For Wind Loading q10 = 0.30 kPa														
		Post Spacing, 2.4 m					Post Spacing, 3.6 m					Post Spacing, 4.8 m				
		Roof Load, kPa					Roof Load, kPa					Roof Load, kPa				
		1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3
9.14	≤3.0	A	A	A	A	A	A	A	A	B	B	A	B	B	B	C
	3.6	A	A	A	A	B	A	B	B	B	C	B	C	C	C	C
	4.2	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C
	4.8	C	C	C	C	C	C	C	C	C	C	C	C	C	D	D
	6.0	C	C	C	C	C	C	D	D	D	—	D	—	—	—	—
12.1	≤3.0	A	A	A	A	A	A	A	B	B	B	B	B	C	C	C
	3.6	A	A	B	B	B	B	B	C	C	C	C	C	C	C	C
	4.2	B	B	B	C	C	C	C	C	C	C	C	C	C	D	D
	4.8	C	C	C	C	C	C	C	C	D	D	C	D	D	—	—
	6.0	C	C	C	D	D	D	D	—	—	—	—	—	—	—	—
15.2	≤3.0	A	A	A	B	B	A	B	B	C	C	B	C	C	C	C
	3.6	A	B	B	B	C	B	C	C	C	C	C	C	C	C	D
	4.2	B	B	C	C	C	C	C	C	C	D	C	C	D	D	—
	4.8	C	C	C	C	C	C	C	D	D	—	D	D	—	—	—
	6.0	C	C	D	D	—	D	—	—	—	—	—	—	—	—	—
18.2	≤3.0	A	A	B	B	B	B	B	C	C	C	B	C	C	C	D
	3.6	B	B	B	C	C	C	C	C	C	C	C	C	C	D	D
	4.2	B	C	C	C	C	C	C	C	D	D	C	D	D	—	—
	4.8	C	C	C	C	D	C	D	D	—	—	D	—	—	—	—
	6.0	C	D	D	—	—	—	—	—	—	—	—	—	—	—	—
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Legend - Post Sizes:

A = 89 mm x 140 mm
B = 140 mm x 140 mm
C = 140 mm x 184 mm
D = 184 mm x 184 mm

Notes to Table 1.3.2.C.:

(1) Designs are based on load combinations of total roof load and wind load acting at the same time on a closed building.
(2) Posts shall be oriented with the long dimension parallel to the building width.
(3) Bracing systems shall be specified by a competent designer.
(4) Posts shall be situated on footings and shall be anchored to prevent wind uplift.
(5) Posts shall be constrained against lateral movement at ground level and at the footing. Concrete floor, splash-rail and uplift anchor help to meet this condition.
(6) Post designs are based on partial fixity condition due to embedment in soil.
(7) Footing excavations should be backfilled with parent material unless otherwise specified by a competent designer.

Table 1.3.2.D.
Post Sizes for Knee-Braced Farm Buildings of Low Human Occupancy

Forming Part of Sentence 1.3.2.(1)

Building Width, m	Wall Height, m	Spruce-Pine-Fir No. 1 Dressed (Post and Timber Grades)														
		For Wind Loading q10 ≤ 0.45 kPa														
		Post Spacing, 2.4 m					Post Spacing, 3.6 m					Post Spacing, 4.8 m				
		Roof Load, kPa					Roof Load, kPa					Roof Load, kPa				
		1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3
9.14	≤3.0	A	A	A	A	A	A	A	B	B	B	B	B	B	C	C
	3.6	A	A	A	B	B	B	B	B	C	C	C	C	C	C	C
	4.2	B	B	B	B	C	C	C	C	C	C	C	C	C	C	D
	4.8	C	C	C	C	C	C	C	C	C	D	C	D	D	D	—
	6.0	C	C	C	C	D	D	D	—	—	—	—	—	—	—	—
12.1	≤3.0	A	A	A	A	B	A	B	B	B	C	B	B	C	C	C
	3.6	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C
	4.2	B	B	C	C	C	C	C	C	C	C	C	C	D	D	D
	4.8	C	C	C	C	C	C	C	D	D	D	D	D	—	—	—
	6.0	C	C	D	D	D	D	—	—	—	—	—	—	—	—	—
15.2	≤3.0	A	A	B	B	B	B	B	B	C	C	B	C	C	C	C
	3.6	A	B	B	C	C	C	C	C	C	C	C	C	C	D	D
	4.2	B	C	C	C	C	C	C	C	D	D	C	D	D	—	—
	4.8	C	C	C	C	C	C	D	D	D	—	D	—	—	—	—
	6.0	C	D	D	—	—	—	—	—	—	—	—	—	—	—	—
18.2	≤3.0	A	A	B	B	B	B	B	C	C	C	C	C	C	C	D
	3.6	B	B	C	C	C	C	C	C	C	D	C	C	D	D	—
	4.2	C	C	C	C	C	C	C	D	D	D	D	D	—	—	—
	4.8	C	C	C	D	D	C	D	—	—	—	D	—	—	—	—
	6.0	D	D	—	—	—	—	—	—	—	—	—	—	—	—	—
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Legend - Post Sizes:

A = 89 mm x 140 mm	B = 140 mm x 140 mm	C = 140 mm x 184 mm	D = 184 mm x 184 mm

Notes to Table 1.3.2.D.:

(1) Designs are based on load combinations of total roof load and wind load acting at the same time on a closed building.

(2) Posts shall be oriented with the long dimension parallel to the building width.

(3) Bracing systems shall be specified by a competent designer.

(4) Posts shall be situated on footings and shall be anchored to prevent wind uplift.

(5) Posts shall be constrained against lateral movement at ground level and at the footing. Concrete floor, splash-rail and uplift anchor help to meet this condition.

(6) Post designs are based on partial fixity condition due to embedment in soil.

(7) Footing excavations should be backfilled with parent material unless otherwise specified by a competent designer.

Table 1.3.2.E.
Post Sizes for Diaphragm-Braced Farm Buildings of Low Human Occupancy

Forming Part of Sentence 1.3.2.(1)

Building Width, m	Wall Height, m	Ungraded Lumber, Full-Dimensioned														
		For Wind Loading q10 ≤ 0.30 kPa														
		Post Spacing, 2.4 m					Post Spacing, 3.6 m					Post Spacing, 4.8 m				
		Roof Load, kPa					Roof Load, kPa					Roof Load, kPa				
		1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3
9.14	≤3.0	A	A	A	A	A	A	A	A	B	B	A	B	B	C	C
	3.6	A	A	A	A	B	A	B	B	B	C	B	C	C	C	C
	4.2	B	B	B	B	B	B	B	C	C	C	C	C	C	C	D
	4.8	B	B	B	B	C	C	C	C	C	C	C	C	C	D	D
	6.0	C	C	C	C	C	C	C	D	D	D	D	D	—	—	—
12.1	≤3.0	A	A	A	A	B	A	B	B	B	C	B	B	C	C	C
	3.6	A	A	B	B	B	B	B	C	C	C	C	C	C	C	D
	4.2	B	B	B	B	C	B	C	C	C	C	C	C	D	D	D
	4.8	B	B	C	C	C	C	C	C	C	D	C	D	D	D	—
	6.0	C	C	C	C	D	C	D	D	—	—	D	—	—	—	—
15.2	≤3.0	A	A	A	B	B	B	B	C	C	C	B	C	C	D	D
	3.6	A	B	B	B	C	B	C	C	C	C	C	C	D	D	D
	4.2	B	B	C	C	C	C	C	C	D	D	C	D	D	—	—
	4.8	B	C	C	C	C	C	C	D	D	D	D	D	—	—	—
	6.0	C	C	C	D	D	D	D	—	—	—	—	—	—	—	—
18.2	≤3.0	A	A	B	B	C	B	B	C	C	D	C	C	D	D	—
	3.6	A	B	B	C	C	C	C	C	D	D	C	D	D	—	—
	4.2	B	C	C	C	C	C	C	D	D	D	C	D	—	—	—
	4.8	C	C	C	C	D	C	D	D	—	—	D	—	—	—	—
	6.0	C	C	D	D	—	D	—	—	—	—	—	—	—	—	—
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Legend - Post Sizes:

A = 101.6 mm x 152.4 mm B = 152.4 mm x 152.4 mm C = 152.4 mm x 203.2 mm D = 203.2 mm x 203.2 mm

Notes to Table 1.3.2.E:

(1) Designs are based on load combinations of total roof load and wind load acting at the same time on a closed building.
(2) Posts shall be oriented with the long dimension parallel to the building width.
(3) Bracing systems shall be specified by a competent designer.
(4) Posts shall be situated on footings and shall be anchored to prevent wind uplift.
(5) Posts shall be constrained against lateral movement at ground level and at the footing. Concrete floor, splash-rail and uplift anchor help to meet this condition.
(6) Post designs are based on partial fixity condition due to embedment in soil.
(7) Footing excavations should be backfilled with parent material unless otherwise specified by a competent designer.

Table 1.3.2.F.
Post Sizes for Diaphragm-Braced Farm Buildings of Low Human Occupancy
Forming Part of Sentence 1.3.2.(1)

Building Width, m	Wall Height, m	Ungraded Lumber, Full-Dimensioned														
		For Wind Loading q10 ≤ 0.45 kPa														
		Post Spacing, 2.4 m					Post Spacing, 3.6 m					Post Spacing, 4.8 m				
		Roof Load, kPa					Roof Load, kPa					Roof Load, kPa				
		1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3
9.14	≤3.0	A	A	A	A	A	A	A	B	B	B	B	B	C	C	C
	3.6	A	A	A	B	B	B	B	B	C	C	C	C	C	C	C
	4.2	B	B	B	B	C	C	C	C	C	C	C	C	C	D	D
	4.8	B	B	C	C	C	C	C	C	C	D	C	D	D	D	—
	6.0	C	C	C	C	C	D	D	D	—	—	—	—	—	—	—
12.1	≤3.0	A	A	A	B	B	B	B	B	C	C	B	C	C	C	C
	3.6	A	A	B	B	B	B	C	C	C	C	C	C	C	D	D
	4.2	B	B	B	C	C	C	C	C	C	D	C	D	D	D	—
	4.8	B	C	C	C	C	C	C	D	D	D	D	D	—	—	—
	6.0	C	C	C	D	D	D	D	—	—	—	—	—	—	—	—
15.2	≤3.0	A	A	B	B	B	B	B	C	C	C	C	C	C	D	D
	3.6	A	B	B	C	C	C	C	C	C	D	C	C	D	D	—
	4.2	B	C	C	C	C	C	C	C	D	D	D	D	D	—	—
	4.8	C	C	C	C	C	C	D	D	D	—	D	—	—	—	—
	6.0	C	C	D	D	—	D	—	—	—	—	—	—	—	—	—
18.2	≤3.0	A	B	B	B	C	B	C	C	C	D	C	C	D	D	—
	3.6	B	B	C	C	C	C	C	C	D	D	C	D	D	—	—
	4.2	B	C	C	C	C	C	C	D	D	—	D	D	—	—	—
	4.8	C	C	C	C	D	D	D	D	—	—	—	—	—	—	—
	6.0	C	D	D	—	—	—	—	—	—	—	—	—	—	—	—
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Legend - Post Sizes:

A = 101.6 mm x 152.4 mm
B = 152.4 mm x 152.4 mm
C = 152.4 mm x 203.2 mm
D = 203.2 mm x 203.2 mm

Notes to Table 1.3.2.F.:

(1) Designs are based on load combinations of total roof load and wind load acting at the same time on a closed building.
(2) Posts shall be oriented with the long dimension parallel to the building width.
(3) Bracing systems shall be specified by a competent designer.
(4) Posts shall be situated on footings and shall be anchored to prevent wind uplift.
(5) Posts shall be constrained against lateral movement at ground level and at the footing. Concrete floor, splash-rail and uplift anchor help to meet this condition.
(6) Post designs are based on partial fixity condition due to embedment in soil.
(7) Footing excavations should be backfilled with parent material unless otherwise specified by a competent designer.

Table 1.3.2.G.
Post Sizes for Knee-Braced Farm Buildings of Low Human Occupancy
Forming Part of Sentence 1.3.2.(1)

Building Width, m	Wall Height, m	Ungraded Lumber, Full-Dimensioned														
		For Wind Loading q10 ≤ 0.30 kPa														
		Post Spacing, 2.4 m					Post Spacing, 3.6 m					Post Spacing, 4.8 m				
		Roof Load, kPa					Roof Load, kPa					Roof Load, kPa				
		1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3
9.14	≤3.0	A	A	A	A	A	A	A	B	B	B	B	B	C	C	C
	3.6	A	A	A	B	B	B	B	B	C	C	B	C	C	C	C
	4.2	B	B	B	B	C	B	C	C	C	C	C	C	C	D	D
	4.8	C	C	C	C	C	C	C	C	C	D	C	C	D	D	—
	6	C	C	C	C	D	C	D	D	—	—	D	—	—	—	—
12.1	≤3.0	A	A	A	B	B	A	B	B	C	C	B	C	C	C	D
	3.6	A	B	B	B	C	B	C	C	C	C	C	C	C	D	D
	4.2	B	B	C	C	C	C	C	C	C	D	C	C	D	D	—
	4.8	C	C	C	C	C	C	C	D	D	D	D	D	—	—	—
	6.0	C	C	C	D	D	D	D	—	—	—	—	—	—	—	—
15.2	≤3.0	A	A	B	B	B	B	B	C	C	C	C	C	C	D	D
	3.6	A	B	B	C	C	C	C	C	C	D	C	C	D	D	—
	4.2	B	C	C	C	C	C	C	D	D	D	C	D	—	—	—
	4.8	C	C	C	C	D	C	D	D	—	—	D	—	—	—	—
	6.0	C	D	D	D	—	D	—	—	—	—	—	—	—	—	—
18.2	≤3.0	A	B	B	C	C	B	C	C	C	D	C	C	D	D	—
	3.6	B	B	C	C	C	C	C	C	D	D	C	D	D	—	—
	4.2	C	C	C	C	D	C	C	D	—	—	D	D	—	—	—
	4.8	C	C	C	D	D	C	D	—	—	—	D	—	—	—	—
	6.0	C	D	—	—	—	—	—	—	—	—	—	—	—	—	—
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Legend - Post Sizes:

A = 101.6 mm x 152.4 mm B = 152.4 mm x 152.4 mm C = 152.4 mm x 203.2 mm D = 203.2 mm x 203.2 mm

Notes to Table 1.3.2.G.:

(1) Designs are based on load combinations of total roof load and wind load acting at the same time on a closed building.

(2) Posts shall be oriented with the long dimension parallel to the building width.

(3) Bracing systems shall be specified by a competent designer.

(4) Posts shall be situated on footings and shall be anchored to prevent wind uplift.

(5) Posts shall be constrained against lateral movement at ground level and at the footing. Concrete floor, splash-rail and uplift anchor help to meet this condition.

(6) Post designs are based on partial fixity condition due to embedment in soil.

(7) Footing excavations should be backfilled with parent material unless otherwise specified by a competent designer.

Table 1.3.2.H.
Post Sizes for Knee-Braced Farm Buildings of Low Human Occupancy

Forming Part of Sentence 1.3.2.(1)

Building Width, m	Wall Height, m	Ungraded Lumber, Full-Dimensioned														
		For Wind Loading q10 ≤ 0.45 kPa														
		Post Spacing, 2.4 m					Post Spacing, 3.6 m					Post Spacing, 4.8 m				
		Roof Load, kPa					Roof Load, kPa					Roof Load, kPa				
		1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3
9.14	≤ 3.0	A	A	A	A	B	A	B	B	B	C	B	C	C	C	C
	3.6	A	A	B	B	B	B	C	C	C	C	C	C	C	C	D
	4.2	B	B	B	C	C	C	C	C	C	C	C	C	D	D	D
	4.8	C	C	C	C	C	C	C	C	D	D	D	D	D	—	—
	6.0	C	C	C	D	D	D	D	—	—	—	—	—	—	—	—
12.1	≤ 3.0	A	A	B	B	B	B	B	C	C	C	C	C	C	C	D
	3.6	A	B	B	C	C	C	C	C	C	C	C	C	D	D	D
	4.2	B	C	C	C	C	C	C	C	D	D	C	D	D	—	—
	4.8	C	C	C	C	C	C	D	D	D	—	D	—	—	—	—
	6.0	C	D	D	D	—	—	—	—	—	—	—	—	—	—	—
15.2	≤ 3.0	A	B	B	B	C	B	C	C	C	C	C	C	D	D	D
	3.6	B	B	C	C	C	C	C	C	D	D	C	D	D	—	—
	4.2	C	C	C	C	C	C	C	D	D	—	D	D	—	—	—
	4.8	C	C	C	D	D	D	D	—	—	—	—	—	—	—	—
	6.0	D	D	D	—	—	—	—	—	—	—	—	—	—	—	—
18.2	≤ 3.0	A	B	B	C	C	C	C	C	D	D	C	D	D	—	—
	3.6	B	C	C	C	C	C	C	D	D	—	D	D	—	—	—
	4.2	C	C	C	C	C	C	C	D	D	—	D	D	—	—	—
	4.8	C	C	C	C	D	C	D	D	—	—	D	—	—	—	—
	6.0	C	C	D	D	D	D	—	—	—	—	—	—	—	—	—
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Legend - Post Sizes:

A = 101.6 mm x 152.4 mm
B = 152.4 mm x 152.4 mm
C = 152.4 mm x 203.2 mm
D = 203.2 mm x 203.2 mm

Notes to Table 1.3.2.H.:

(1) Designs are based on load combinations of total roof load and wind load acting at the same time on a closed building.
(2) Posts shall be oriented with the long dimension parallel to the building width.
(3) Bracing systems shall be specified by a competent designer.
(4) Posts shall be situated on footings and shall be anchored to prevent wind uplift.
(5) Posts shall be constrained against lateral movement at ground level and at the footing. Concrete floor, splash-rail and uplift anchor help to meet this condition.
(6) Post designs are based on partial fixity condition due to embedment in soil.
(7) Footing excavations should be backfilled with parent material unless otherwise specified by a competent designer.

Table 1.3.2.I.
Post Sizes for Farm Buildings of Low Human Occupancy (With Second Storey Loading)

Forming Part of Sentence 1.3.2.(1)

Sidewall Height, m	Total Roof Load, kPa	Spruce-Pine-Fir, No. 1, Dressed (Post and Timber Grades)																Second Storey Plate, kN/m
		Wind load: q10 ≤ 0.30 kPa								Wind load: q10 ≤ 0.45 kPa								
		2.4 m o.c.				3.6 m o.c.				2.4 m o.c.				3.6 m o.c.				
		Building Width, m				Building Width, m				Building Width, m				Building Width, m				
		9.14	12.2	15.2	18.3	9.14	12.2	15.2	18.3	9.14	12.2	15.2	18.3	9.14	12.2	15.2	18.3	
3.0	1.9	A	A	A	A	A	A	B	B	A	A	A	A	A	B	B	B	14.6
	2.4	A	A	A	A	A	B	B	B	A	A	A	B	A	B	B	B	
	2.8	A	A	A	B	A	B	B	C	A	A	B	B	B	B	B	C	
	3.3	A	A	B	B	B	B	B	C	A	A	B	B	B	B	C	C	
3.6	1.9	A	A	A	B	A	B	B	C	A	A	B	B	B	B	C	C	14.6
	2.4	A	A	B	B	B	B	C	C	A	B	B	B	B	C	C	C	
	2.8	A	B	B	B	B	B	C	C	A	B	B	B	B	C	C	C	
	3.3	A	B	B	C	B	C	C	C	B	B	B	C	C	C	C	C	
3.0	1.9	A	A	A	A	A	A	B	B	A	A	A	A	A	A	B	B	7.3
	2.4	A	A	A	A	A	A	B	B	A	A	A	A	A	B	B	B	
	2.8	A	A	A	B	A	B	B	B	A	A	A	B	B	B	B	C	
	3.3	A	A	B	B	B	B	B	C	A	A	B	B	B	B	C	C	
3.6	1.9	A	A	A	B	A	B	B	B	A	A	B	B	B	B	C	C	7.3
	2.4	A	A	B	B	B	B	C	C	A	B	B	B	B	B	C	C	
	2.8	A	A	B	B	B	B	C	C	A	B	B	B	B	C	C	C	
	3.3	A	B	B	B	B	C	C	C	B	B	B	C	C	C	C	C	
3.0	1.9	A	A	A	A	A	A	A	B	A	A	A	A	A	A	B	B	3.6
	2.4	A	A	A	A	A	A	B	B	A	A	A	A	A	B	B	B	
	2.8	A	A	A	B	A	B	B	B	A	A	A	B	B	B	B	C	
	3.3	A	A	A	B	A	B	B	C	A	A	B	B	B	B	C	C	
3.6	1.9	A	A	A	B	A	B	B	B	A	A	A	B	B	B	B	C	3.6
	2.4	A	A	B	B	B	B	B	C	A	A	B	B	B	B	C	C	
	2.8	A	A	B	B	B	B	C	C	A	B	B	B	B	C	C	C	
	3.3	A	B	B	B	B	C	C	C	A	B	B	C	B	C	C	C	
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Legend - Post Sizes:

A = 89 mm x 140 mm
B = 140 mm x 140 mm
C = 140 mm x 184 mm

Notes to Table 1.3.2.I.:

(1) Designs are based on load combinations of total roof load, wind load and stored product acting at the same time on a closed building.

(2) All notes following Table 1.3.2.A. apply, with the following conditions/exceptions:

- 14.6 kN/m loading: Full 4.8 m sidewall hay/straw storage space above. It is supported by beams spaced at 3.6 m o.c. The outside plate carries a 1.8 m floor width. If the loading is greater, refer to a qualified person for design.
- 7.3 kN/m loading: Full 2.4 m sidewall hay/straw storage space above or a gambrel roof structure > 9.14 m in total width. Floor support beams as above.
- 3.6 kN/m loading: Small gambrel roof structure or storage space for light storage. Floor support beams as above.

Table 1.3.2.J.
Round Posts
Forming Part of Sentence 1.3.2.(1)

Ungraded Lumber Full-dimension Size, mm	Equivalent Diameter Full Size mm
50.8 x 101.6	101.6
50.8 x 152.4	127.0
50.8 x 203.2	152.4
50.8 x 254.0	177.8
50.8 x 304.8	203.2
76.2 x 304.8	228.6
76.2 x 355.6	254.0
101.6 x 152.4	158.8
101.6 x 304.8	203.2
101.6 x 355.6	279.4
127.0 x 203.2	209.6
127.0 x 254.0	241.3
152.4 x 152.4	190.5
152.4 x 203.2	222.3
152.4 x 254.0	260.4
203.2 x 203.2	247.7
203.2 x 254.0	285.8
203.2 x 304.8	317.5
254.0 x 304.8	342.9
254.0 x 355.6	381.0
Column 1	2

Notes to Table 1.3.2.J.:

(1) When selecting round, ungraded lumber, ensure that the material is of good quality.

(2) Any timber that is in contact with ground shall be chemically treated to resist growth of fungus and decay.

(3) Equivalent diameter indicated in this Table refers to the smallest diameter of a tapering pole.

(4) Used hydro or telephone poles may be used if they are of good quality and are chemically treated to prevent decay.

(5) Indicated equivalent diameter will provide bending, shear and deflection resisting capabilities equal to or better than the rectangular section that it replaces.

Table 1.3.3.K.
Common Rafter Sizes for Farm Buildings of Low Human Occupancy
Forming Part of Sentence 1.3.3.(1)

Rafter Span m	Spruce-Pine-Fir No. 1 and No. 2 (Dressed Lumber)														
	Rafter Spacing														
	300 mm					400 mm					600 mm				
	Live Load, kPa					Live Load, kPa					Live Load, kPa				
	1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3
2.4	A	A	B	B	B	A	B	B	B	B	B	B	B	B	B
3.0	B	B	B	B	B	B	B	B	B	C	B	B	C	C	D
3.6	B	B	C	C	C	B	C	C	C	C	C	C	D	D	D
4.2	B	C	C	C	C	C	C	C	D	D	C	D	D	E	E
4.8	C	C	D	D	D	C	D	D	E	E	D	E	E	—	—
5.4	C	D	D	D	E	D	D	E	E	—	E	E	—	—	—
6.0	D	D	D	E	—	D	E	E	—	—	E	—	—	—	—
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Legend - Rafter Sizes:

A = 38 mm x 89 mm
C = 38 mm x 184 mm
B = 38 mm x 140 mm
D = 38 mm x 235 mm
E = 38 mm x 286 mm

Notes to Table 1.3.3.K.:

(1) The rafter span is the unsupported length of the rafter from plate to plate or from plate to ridge. A dead load of 0.24 kPa is incorporated to allow for weight of the roof sheathing and rafter.

Table 1.3.3.L.
Common Rafter Sizes for Farm Buildings of Low Human Occupancy
Forming Part of Sentence 1.3.3.(1)

Rafter Span m	Ungraded Lumber, Full-Dimension														
	Rafter Spacing														
	300 mm					400 mm					600 mm				
	Live Load, kPa					Live Load, kPa					Live Load, kPa				
	1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3
2.4	A	A	B	B	B	B	B	B	B	C	B	B	C	C	D
3.0	B	B	B	C	C	B	C	C	C	D	C	C	D	D	E
3.6	B	C	C	D	D	C	C	D	D	E	D	D	E	F	F
4.2	C	C	D	D	E	D	D	E	E	F	E	F	F	F	G
4.8	C	D	E	E	F	D	E	F	F	F	F	F	F	G	I
5.4	D	E	F	F	F	E	F	F	F	G	F	G	H	I	—
6.0	E	F	F	F	G	F	F	G	G	I	F	H	I	—	—
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Legend - Rafter Sizes:

A = 50.8 mm x 101.6 mm
B = 50.8 mm x 152.4 mm
C = 50.8 mm x 203.2 mm
D = 50.8 mm x 254.0 mm
E = 50.8 mm x 304.8 mm
F = 76.2 mm x 304.8 mm
G = 76.2 mm x 355.6 mm
H = 101.6 mm x 304.8 mm
I = 101.6 mm x 355.6 mm

Notes to Table 1.3.3.L.:

(1) The rafter span is the unsupported length of the rafter from plate to plate or from plate to ridge. A dead load of 0.24 kPa is incorporated to allow for weight of the roof sheathing and rafter.

Table 1.3.3.M.
Floor Joists for Farm Buildings of Low Human Occupancy -Intermittent Loads(1)

Forming Part of Sentence 1.3.3.(1)

Joist Span m	Spruce-Pine-Fir, No. 1 and No. 2 (Dressed Lumber)																	
	Joist Spacing																	
	300 mm						400 mm						600 mm					
	Live Load, kPa						Live Load, kPa						Live Load, kPa					
	1.9	2.8	3.8	4.8	6.7	8.6	1.9	2.8	3.8	4.8	6.7	8.6	1.9	2.8	3.8	4.8	6.7	8.6
2.4	A	B	B	B	B	C	B	B	B	B	C	C	B	B	B	C	D	D
3.0	B	B	B	C	C	D	B	B	C	C	D	D	B	C	C	D	E	—
3.6	B	C	C	C	D	D	C	C	C	D	E	E	C	D	D	E	—	—
4.2	C	C	D	D	E	E	C	D	D	E	—	—	D	d	E	—	—	—
4.8	C	D	D	E	—	—	D	D	E	E	—	—	D	E	—	—	—	—
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Legend - Joist Sizes:

A = 38 mm x 89 mm B = 38 mm x 140 mm C = 38 mm x 184 mm D = 38 mm x 235 mm E = 38 mm x 286 mm

Notes to Table 1.3.3.M.:

(1) Loads are applied to the floor intermittently. (When loads are applied for extended periods of time, use Table 1.3.3.N.)

(2) A dead load of 0.48 kPa is incorporated to allow for the dead weight of the floor system.

Table 1.3.3.N.
Floor Joists for Farm Buildings of Low Human Occupancy - Continuous Loads(1)

Forming Part of Sentence 1.3.3.(1)

Joist Span m	Spruce-Pine-Fir, No. 1 and No. 2 (Dressed Lumber)																	
	Joist Spacing																	
	300 mm						400 mm						600 mm					
	Live Load, kPa						Live Load, kPa						Live Load, kPa					
	1.9	2.8	3.8	4.8	6.7	8.6	1.9	2.8	3.8	4.8	6.7	8.6	1.9	2.8	3.8	4.8	6.7	8.6
2.4	A	B	B	B	C	C	B	B	B	C	D	E	B	C	C	D	—	—
3.0	B	B	C	C	D	E	B	C	C	D	E	—	C	D	D	E	—	—
3.6	B	C	D	D	E	—	C	D	D	E	—	—	D	E	—	—	—	—
4.2	C	D	D	E	—	—	D	E	E	—	—	—	E	—	—	—	—	—
4.8	D	D	E	—	—	—	D	E	—	—	—	—	—	—	—	—	—	—
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Legend - Joist Sizes:

A = 38 mm x 89 mm B = 38 mm x 140 mm C = 38 mm x 184 mm D = 38 mm x 235 mm E = 38 mm x 286 mm

Notes to Table 1.3.3.N.:

(1) For use of floors that support hay, straw, grain or other continuous loads.

(2) A dead load of 0.48 kPa is incorporated to allow for the dead weight of the floor system.

Table 1.3.3.O.
Built-up Wood Beam Sizes for Farm Buildings of Low Human Occupancy -Intermittent Loads(1)
Forming Part of Sentence 1.3.3.(1)

Beam Span, m	Spruce-Pine-Fir, No. 1 and No. 2 (Dressed Lumber)										
	Total Load on Beam, kN/m										
	5.84	8.76	11.67	14.59	17.51	20.43	23.35	26.27	29.19	32.11	35.03
1.8	A	A	A	B	B	D	D	G	G	J	L
2.4	A	A	B	D	E	H	J	L	—	—	—
3.0	A	C	E	H	J	K	—	—	—	—	—
3.6	C	H	J	L	—	—	—	—	—	—	—
4.2	E	J	L	—	—	—	—	—	—	—	—
4.8	I	L	—	—	—	—	—	—	—	—	—
Column 1	2	3	4	5	6	7	8	9	10	11	12

Legend - Beam Sizes:

A = 3 - 38 mm x 184 mm
B = 4 - 38 mm x 184 mm
C = 3 - 38 mm x 235 mm
D = 5 - 38 mm x 184 mm
E = 3 - 38 mm x 286 mm
F = 4 - 38 mm x 235 mm
G = 6 - 38 mm x 184 mm
H = 5 - 38 mm x 235 mm
I = 4 - 38 mm x 286 mm
J = 6 - 38 mm x 235 mm
K = 5 - 38 mm x 286 mm
L = 6 - 38 mm x 286 mm

Notes to Table 1.3.3.O.:

(1) Loads are applied to the beam intermittently.
(2) A dead load of 0.584 kN/m is assumed for all beams.
(3) Floors systems supporting heavy loads over larger spans will require the use of steel beams or other specialized materials.

Table 1.3.3.P.
Built-up Wood Beam Sizes for Farm Buildings of Low Human Occupancy - -Continuous Loads(1)
Forming Part of Sentence 1.3.3.(1)

Beam Span, m	Spruce-Pine-Fir, No. 1 and No. 2 (Dressed Lumber)						
	Total Load on Beam, kN/m						
	5.84	8.76	11.67	14.59	17.51	20.43	23.35
1.8	A	A	B	D	G	J	L
2.4	A	C	E	J	L	—	—
3.0	D	H	J	L	—	—	—
3.6	H	K	—	—	—	—	—
4.2	K	—	—	—	—	—	—
4.8	L	—	—	—	—	—	—
Column 1	2	3	4	5	6	7	8

Legend - Beam Sizes:

A = 3 - 38 mm x 184 mm
B = 4 - 38 mm x 184 mm
C = 3 - 38 mm x 235 mm
D = 5 - 38 mm x 184 mm
E = 3 - 38 mm x 286 mm
F = 4 - 38 mm x 235 mm
G = 6 - 38 mm x 184 mm
H = 5 - 38 mm x 235 mm
I = 4 - 38 mm x 286 mm
J = 6 - 38 mm x 235 mm
K = 5 - 38 mm x 286 mm
L = 6 - 38 mm x 286 mm

Notes to Table 1.3.3.P.:

(1) For use of floors that support hay, straw, grain or other continuous loads.
(2) A dead load of 0.48 kPa is assumed for all beams.
(3) Floor systems supporting heavy loads over larger spans will require use of steel beams or other specialized materials.

Table 1.3.3.Q.
Ungraded Lumber, Full-Dimension Roof Beam Sizes for Farm Buildings of Low Human Occupancy (1)

Forming Part of Sentence 1.3.3.(1)

Beam Span, m	Total Load on Built-up Wood Beam, kN/m							
	5.84	8.76	11.67	14.59	17.51	20.43	23.35	26.27
1.8	A	A	B	C	D	F	G	H
2.4	B	D	E	H	I	J	—	—
3.0	D	G	I	—	—	—	—	—
3.6	G	J	—	—	—	—	—	—
4.2	J	—	—	—	—	—	—	—
Column 1	2	3	4	5	6	7	8	9

Legend - Built-up Wood Beam Sizes:

A = 3 - 50.8 mm x 203.2 mm

B = 4 - 50.8 mm x 203.2 mm

C = 3 - 50.8 mm x 254.0 mm

D = 5 - 50.8 mm x 203.2 mm

E = 6 - 50.8 mm x 203.2 mm

F = 4 - 50.8 mm x 254.0 mm

G = 5 - 50.8 mm x 254.0 mm

H = 4 - 50.8 mm x 304.8 mm

I = 5 - 50.8 mm x 304.8 mm

J = 6 - 50.8 mm x 304.8 mm

Notes to Table 1.3.3.Q.:

(1) Ungraded lumber, full-dimension, built-up wood beam.
(2) A dead load of 0.584 kN/m is assumed.
(3) Beams are sized for roof load only.

Table 1.3.3.R.
Ungraded Lumber, Full-Dimension Roof Beam Sizes for Farm Buildings of Low Human Occupancy (1)

Forming Part of Sentence 1.3.3.(1)

Beam Span, m	Total Load on Sawn Beam, kN/m							
	5.84	8.76	11.67	14.59	17.51	20.43	23.35	26.27
1.8	A	A	B	C	D	E	F	G
2.4	A	B	D	D	F	G	—	—
3.0	C	D	E	F	—	—	—	—
3.6	D	F	G	—	—	—	—	—
4.2	E	G	—	—	—	—	—	—
Column 1	2	3	4	5	6	7	8	9

Legend - Sawn Beam Sizes:

A = 127.0 mm x 203.2 mm

B = 127.0 mm x 254.0 mm

C = 152.4 mm x 254.0 mm

D = 203.2 mm x 254.0 mm

E = 203.2 mm x 304.8 mm

F = 254.0 mm x 304.8 mm

G = 254.0 mm x 355.6 mm

Notes to Table 1.3.3.R.:

(1) Ungraded lumber, full-dimension, sawn wood beam.
(2) A dead load of 0.584 kN/m is assumed.
(3) Beams are sized for roof load only.

Table 1.3.3.S.
Roof Plate-Beams and Lintels for Farm Buildings of Low Human Occupancy

Forming Part of Sentence 1.3.3.(1)

Building Width, m	Spruce-Pine-Fir, No. 1 and No. 2 (Dressed Lumber)								
	Total Roof Load, kPa, with Post Spacing at 2.4 m								
	A	B	C	D	E	F	G	H	I
7.3	1.67	2.77	3.68	2.49	4.11	5.50	3.35	5.55	7.42
8.5	1.43	2.34	3.16	2.15	3.54	4.74	2.87	4.74	6.36
9.7	1.24	2.05	2.77	1.86	3.11	4.11	2.53	4.16	5.55
10.9	—	1.81	2.44	1.67	2.72	3.68	2.25	3.68	4.93
12.1	—	1.62	2.20	1.48	2.49	3.30	2.01	3.30	4.45
13.4	—	1.48	2.01	1.34	2.25	3.01	1.81	3.01	4.02
14.6	—	1.38	1.81	1.24	2.05	2.72	1.67	2.77	3.68
15.8	—	1.24	1.67	—	1.91	2.53	1.53	2.53	3.40
17.0	—	—	1.58	—	1.77	2.34	1.43	2.39	3.16
18.2	—	—	1.48	—	1.62	2.20	1.34	2.20	2.96
Building Width, m	Total Roof Load, kPa, with Post Spacing at 3.0 m								
	A	B	C	D	E	F	G	H	I
7.3	—	1.72	2.29	1.53	2.58	3.44	2.10	3.44	4.64
8.5	—	1.48	1.96	1.34	2.20	2.96	1.77	2.96	3.97
9.7	—	1.29	1.72	—	1.91	2.58	1.58	2.58	3.44
10.9	—	—	1.53	—	1.72	2.29	1.38	2.29	3.06
12.1	—	—	1.38	—	1.53	2.05	1.24	2.05	2.77
13.4	—	—	1.24	—	1.38	1.86	—	1.86	2.53
14.6	—	—	—	—	1.29	1.72	—	1.72	2.29
15.8	—	—	—	—	—	1.58	—	1.58	2.10
17.0	—	—	—	—	—	1.48	—	1.48	1.96
18.2	—	—	—	—	—	1.38	—	1.38	1.81
Building Width, m	Total Roof Load, kPa, with Post Spacing at 3.6 m								
	A	B	C	D	E	F	G	H	I
7.3	—	1.38	1.81	1.24	2.05	2.72	1.67	2.77	3.68
8.5	—	—	1.58	—	1.77	2.34	1.43	2.39	3.16
9.7	—	—	1.38	—	1.53	2.05	1.24	2.05	2.77
10.9	—	—	1.19	—	1.38	1.81	—	1.81	2.44
12.1	—	—	—	—	1.24	1.62	—	1.67	2.20
13.4	—	—	—	—	—	1.48	—	1.48	2.01
14.6	—	—	—	—	—	1.38	—	1.38	1.81
15.8	—	—	—	—	—	1.24	—	1.29	1.67
17.0	—	—	—	—	—	—	—	—	1.58
18.2	—	—	—	—	—	—	—	—	1.48
Column 1	2	3	4	5	6	7	8	9	10

Legend - Roof Plate-Beam and Lintel Sizes:

A = 2 - 38 mm x 184 mm
B = 3 - 38 mm x 184 mm
C = 4 - 38 mm x 184 mm
D = 2 - 38 mm x 235 mm
E = 3 - 38 mm x 235 mm
F = 4 - 38 mm x 235 mm
G = 2 - 38 mm x 286 mm
H = 3 - 38 mm x 286 mm
I = 4 - 38 mm x 286 mm

Notes to Table 1.3.3.S.:

(1) Trusses are at 1.2 m on centres.
(2) Plate-beam/lintel loading can be very significant.
(3) Specifications for anchorage at supporting posts must be specified by a competent designer.

Table 1.3.3.T.
Roof Plate-Beams and Lintels for Farm Buildings of Low Human Occupancy
Forming Part of Sentence 1.3.3.(1)

Building Width, m	Ungraded Lumber-Full Dimension								
	Total Roof Load, kPa, with Post Spacing at 2.4 m								
	A	B	C	D	E	F	G	H	I
7.3	—	1.72	2.29	1.48	2.44	3.25	1.91	3.20	4.26
8.5	—	1.43	1.96	1.24	2.10	2.77	1.67	2.72	3.68
9.7	—	1.29	1.72	—	1.81	2.44	1.43	2.39	3.20
10.9	—	—	1.53	—	1.62	2.15	1.29	2.15	2.87
12.1	—	—	1.34	—	1.48	1.96	—	1.91	2.58
13.4	—	—	1.24	—	1.34	1.77	—	1.72	2.34
14.6	—	—	—	—	1.19	1.62	—	1.58	2.15
15.8	—	—	—	—	—	1.48	—	1.48	1.96
17.0	—	—	—	—	—	1.38	—	1.38	1.81
18.2	—	—	—	—	—	1.29	—	1.29	1.72
Building Width, m	Total Roof Load, kPa, with Post Spacing at 3.0 m								
	A	B	C	D	E	F	G	H	I
7.3	—	—	1.43	—	1.53	2.05	1.19	2.01	2.68
8.5	—	—	1.19	—	1.29	1.72	—	1.72	2.29
9.7	—	—	—	—	—	1.53	—	1.48	2.01
10.9	—	—	—	—	—	1.34	—	1.34	1.77
12.1	—	—	—	—	—	1.19	—	—	1.58
13.4	—	—	—	—	—	—	—	—	1.43
14.6	—	—	—	—	—	—	—	—	1.34
15.8	—	—	—	—	—	—	—	—	1.24
17.0	—	—	—	—	—	—	—	—	—
18.2	—	—	—	—	—	—	—	—	—
Building Width, m	Total Roof Load, kPa, with Post Spacing at 3.6 m								
	A	B	C	D	E	F	G	H	I
7.3	—	—	—	—	1.19	1.62	—	1.58	2.15
8.5	—	—	—	—	—	1.38	—	1.38	1.81
9.7	—	—	—	—	—	1.19	—	—	1.58
10.9	—	—	—	—	—	—	—	—	1.43
12.1	—	—	—	—	—	—	—	—	1.29
13.4	—	—	—	—	—	—	—	—	—
14.6	—	—	—	—	—	—	—	—	—
15.8	—	—	—	—	—	—	—	—	—
17.0	—	—	—	—	—	—	—	—	—
18.2	—	—	—	—	—	—	—	—	—
Column 1	2	3	4	5	6	7	8	9	10

Legend - Roof Plate-Beam and Lintel Sizes:

A = 2 - 50.8 mm x 203.2 mm
B = 3 - 50.8 mm x 203.2 mm
C = 4 - 50.8 mm x 203.2 mm
D = 2 - 50.8 mm x 254.0 mm
E = 3 - 50.8 mm x 254.0 mm
F = 4 - 50.8 mm x 254.0 mm
G = 2 - 50.8 mm x 304.8 mm
H = 3 - 50.8 mm x 304.8 mm
I = 4 - 50.8 mm x 304.8 mm

Notes to Table 1.3.3.T.:

(1) Trusses are at 1.2 m on centres.
(2) Plate-beam/lintel loading can be very significant.
(3) Specifications for anchorage at supporting posts must be specified by a competent designer.

Table 1.3.4.U.
Stud Sizes for Farm Buildings of Low Human Occupancy (Single Storey)

Forming Part of Sentence 1.3.4.(1)

Sidewall Height, m	Total Roof Load, kPa	Spruce-Pine-Fir, No. 1 and No. 2 (Dressed Lumber)															
		Wind Load: q10 ≤ 0.30 kPa								Wind Load: q10 ≤ 0.45 kPa							
		400 mm o.c.				600 mm o.c.				400 mm o.c.				600 mm o.c.			
		Building Width, m				Building Width, m				Building Width, m				Building Width, m			
		9.14	12.2	15.2	18.3	9.14	12.2	15.2	18.3	9.14	12.2	15.2	18.3	9.14	12.2	15.2	18.3
3.0	1.9	A	A	A	A	A	A	A	B	A	A	A	A	A	A	A	B
	2.4	A	A	A	A	A	A	B	B	A	A	A	A	A	A	B	B
	2.8	A	A	A	A	A	A	B	B	A	A	A	A	A	B	B	B
	3.3	A	A	A	B	A	B	B	B	A	A	A	B	A	B	B	B
3.6	1.9	A	A	A	B	A	B	B	B	A	A	A	B	B	B	B	B
	2.4	A	A	B	B	B	B	B	B	A	A	B	B	B	B	B	B
	2.8	A	B	B	B	B	B	B	B	A	B	B	B	B	B	B	B
	3.3	A	B	B	B	B	B	B	B	A	B	B	B	B	B	B	B
4.2	1.9	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	2.4	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	2.8	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	3.3	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
4.8	1.9	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	2.4	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C
	2.8	B	B	B	B	B	B	B	C	B	B	B	B	B	B	C	C
	3.3	B	B	B	B	B	B	C	C	B	B	B	B	B	B	C	C
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

Legend - Stud Sizes:

A = 38 mm x 89 mm

B = 38 mm x 140 mm

C = 38 mm x 184 mm or double 38 mm x 140 mm under the trusses, with an intermediate 38 mm x 140 mm stud at 600 mm.

Notes to Table 1.3.4.U.:

(1) Designs are based on load combinations of total roof load and wind load acting at the same time on a closed building.

(2) It is assumed that the double top plate is rigid enough to cause load sharing amongst all studs regardless of the spacing 400 mm or 600 mm.

(3) Solid bridging shall be used on all walls as follows:

≤ 3.0 m:	1 row at mid-height.
3.6 m - 4.2 m:	2 rows at third-points.
4.8 m:	3 rows at quarter-points.

(4) Wind bracing shall not impose additional bending forces onto the stud.

Table 1.3.4.V.
Stud Sizes for Farm Buildings of Low Human Occupancy (With Second Storey Loading)

Forming Part of Sentence 1.3.4.(1)

Sidewall Height, m	Total Roof Load, kPa	Spruce-Pine-Fir, No. 1 and No. 2 (Dressed Lumber)																Second Storey Plate, kN/m
		Wind Load: q10 < 0.30 kPa								Wind Load: q10 < 0.45 kPa								
		400 mm o.c.				600 mm o.c.				400 mm o.c.				600 mm o.c.				
		Building Width, m				Building Width, m				Building Width, m				Building Width, m				
		9.14	12.2	15.2	18.3	9.14	12.2	15.2	18.3	9.14	12.2	15.2	18.3	9.14	12.2	15.2	18.3	
3.0	1.9	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	14.6
	2.4	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
	2.8	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
	3.3	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
3.6	1.9	B	B	B	B	B	B	B	C	B	B	B	B	B	B	C	C	14.6
	2.4	B	B	B	B	B	B	C	C	B	B	B	B	B	C	C	C	
	2.8	B	B	B	B	B	B	C	C	B	B	B	B	B	C	C	C	
	3.3	B	B	B	B	B	C	C	C	B	B	B	B	C	C	C	C	
3.0	1.9	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	7.3
	2.4	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
	2.8	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
	3.3	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
3.6	1.9	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	7.3
	2.4	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
	2.8	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
	3.3	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	
3.0	1.9	A	A	A	A	A	B	B	B	A	A	A	A	B	B	B	B	3.6
	2.4	A	A	A	B	B	B	B	B	A	A	A	A	B	B	B	B	
	2.8	A	A	B	B	B	B	B	B	A	A	B	B	B	B	B	B	
	3.3	A	A	B	B	B	B	B	B	A	B	B	B	B	B	B	B	
3.6	1.9	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	3.6
	2.4	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
	2.8	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
	3.3	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Legend - Stud Sizes:

A = 38 mm x 89 mm

B = 38 mm x 140 mm

C = 38 mm x 184 mm or double 38 mm x 140 mm

Notes to Table 1.3.4.V.:

(1) Design is based on load combinations of total roof load, wind load and stored product acting at the same time on a closed building.

(2) All notes following Table 1.3.4.U. apply, with the following conditions/exceptions:

- 14.6 kN/m loading: Full 4.8 m sidewall hay/straw storage space above. It is supported by beams spaced at 3.6 m o.c. The outside plate carries a 1.8 m floor width. If the loading is greater, refer to a qualified person for design.
- 7.3 kN/m loading: Full 2.4 m sidewall hay/straw storage space above or a gambrel roof structure >9.14 m in total width. Floor support beams as above.
- 3.6 kN/m loading: Small gambrel roof structure or storage space for light storage. Floor support beams as above.

Table 1.3.4.W.
Stud Sizes for Farm Buildings of Low Human Occupancy (Single Storey)
Forming Part of Sentence 1.3.4.(1)

Sidewall Height, m	Total Roof Load, kPa	Ungraded Lumber, Full-Dimensioned															
		Wind Load: q10 ≤ 0.30 kPa								Wind Load: q10 ≤ 0.45 kPa							
		400 mm o.c.				600 mm o.c.				400 mm o.c.				600 mm o.c.			
		Building Width, m				Building Width, m				Building Width, m				Building Width, m			
		9.14	12.2	15.2	18.3	9.14	12.2	15.2	18.3	9.14	12.2	15.2	18.3	9.14	12.2	15.2	18.3
3.0	1.9	A	A	A	A	A	A	A	B	A	A	A	A	A	A	B	B
	2.4	A	A	A	A	A	A	B	B	A	A	A	A	A	B	B	B
	2.8	A	A	A	A	A	B	B	B	A	A	A	B	B	B	B	B
	3.3	A	A	A	B	A	B	B	B	A	A	A	B	A	B	B	B
3.6	1.9	A	A	A	B	A	B	B	B	A	A	A	B	B	B	B	B
	2.4	A	A	B	B	B	B	B	B	A	A	B	B	B	B	B	B
	2.8	A	B	B	B	B	B	B	B	A	B	B	B	B	B	B	B
	3.3	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C
4.2	1.9	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	2.4	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C
	2.8	B	B	B	B	B	B	B	C	B	B	B	B	B	B	C	C
	3.3	B	B	B	B	B	B	C	C	B	B	B	B	B	C	C	C
4.8	1.9	B	B	B	B	B	B	B	C	B	B	B	B	B	B	C	C
	2.4	B	B	B	B	B	B	C	C	B	B	B	B	B	C	C	C
	2.8	B	B	B	B	B	B	C	C	B	B	B	C	C	C	C	C
	3.3	B	B	B	B	B	C	C	C	B	B	B	C	C	C	C	C
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

Legend - Stud Sizes:
A =50.8 mm x 101.6 mm
B =50.8 mm x 152.4 mm
C =50.8 mm x 203.2 mm or double 50.8 mm x 152.4 mm under the trusses, with an intermediate 50.8 mm x 152.4 mm stud at 600 mm

Notes to Table 1.3.4.W.:

(1) Designs are based on load combinations of total roof load and wind load acting at the same time on a closed building.

(2) It is assumed that the double top plate is rigid enough to cause load sharing amongst all studs regardless of the spacing 400 mm or 600 mm.

(3) Solid bridging shall be used on all walls as follows:

≤ 3.0 m	1 row at mid-height
3.6 m to 4.2 m	2 rows at third-points
4.8 m	3 rows at quarter-points

(4) Wind bracing shall not impose additional bending forces onto the stud.

Ministry of Municipal Affairs and Housing
Building and Development Branch

Ontario

2006 Building Code – Supplementary Standards

Supplementary Standard SC-1

Code of Conduct for Registered Code Agencies

August 15, 2006

Supplementary Standard SC-1

COMMENCEMENT

Supplementary Standard SC-1 comes into force on the 31st day of December, 2006.

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SC-1 Code of Conduct for Registered Code Agencies

1. Standards

A registered code agency shall at all times undertake its responsibilities in a professional manner, and in conformance with the provisions of the Building Code Act, 1992, the building code, and all applicable legislation.

Building code provisions which contain requirements pertaining to the conduct of a registered code agency, include:

Division C	Requirements
Sentence 3.4.3.9.(2)	Suspension, Revocation, Refusal to Register or Renew a Registration
Subsection 3.7.2.	When a Registered Code Agency may not be Appointed or Continue to Act under an Appointment
Sentence 3.7.4.1.(1)	Manner in which a Registered Code Agency shall Perform Functions
Article 3.7.4.3.	Issuance of Certificates by Registered Code Agencies
Article 3.7.4.4.	Issuance of Orders by Registered Code Agencies
Article 3.7.4.5.	Authorized Persons
Article 3.7.4.6.	Prohibition
Article 3.7.4.7.	Information and Records
Sentence 3.7.6.2.(1)	Information to be Provided by a Registered Code Agency to the Director
Article 3.7.6.3.	Information to be Provided by a Registered Code Agency to the Chief Building Official
Subsection 3.7.7.	Referral of Stop Work Order
Column 1	2

2. Application

A registered code agency shall ensure that its officers, directors, employees and other persons engaged to perform functions on behalf of the registered code agency, perform their functions in a manner consistent with the code of conduct.

3. Respect

A registered code agency, while carrying out its functions under an appointment, shall treat persons applying for or holding permits under section 8 of the Building Code Act, as well as persons responsible for design activities, persons engaged in construction, and other persons with whom a registered code agency may come into contact in the course of carrying out its responsibilities, with respect, by being courteous at all times and in all situations.

Index(1)

(1) Items contained in the Index are referenced to the numbering system used in this Code instead of to page numbers.

References occur in Division B unless noted as follows:
[A] - references occur in Division A
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